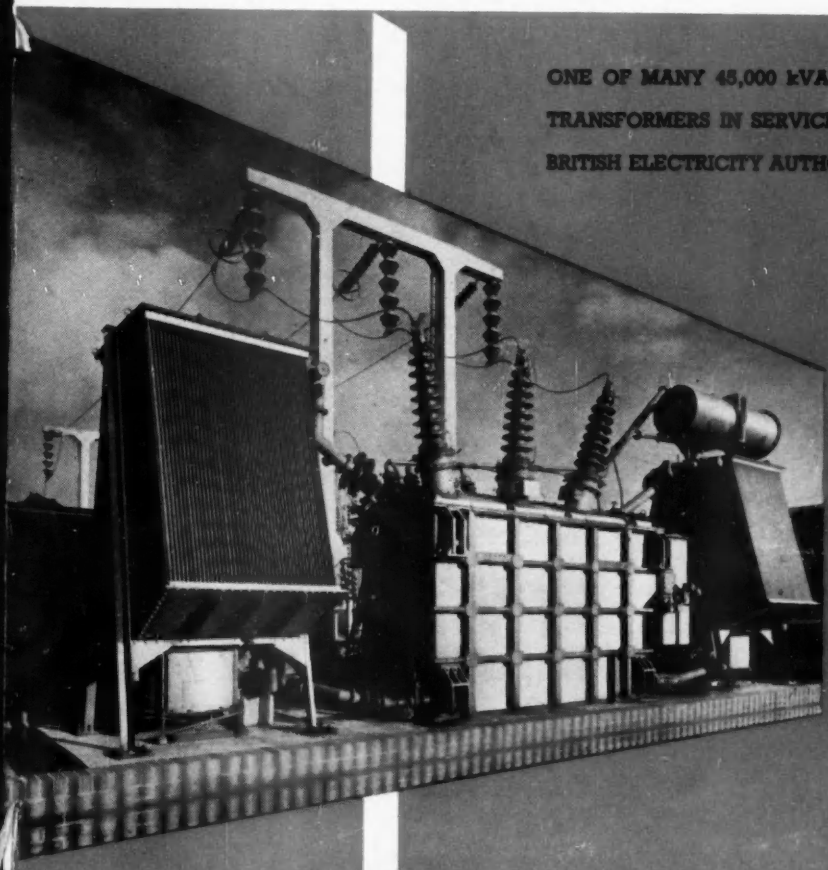
ELECTRICAL TIMES

THURSDAY
2 JULY
1953
NINEPENCE



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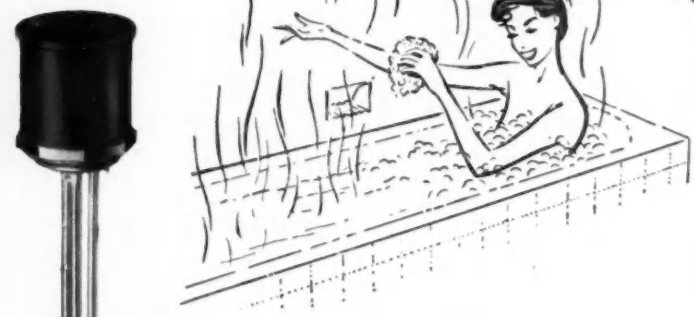

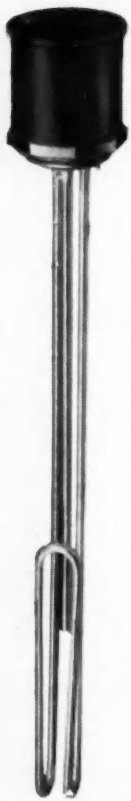

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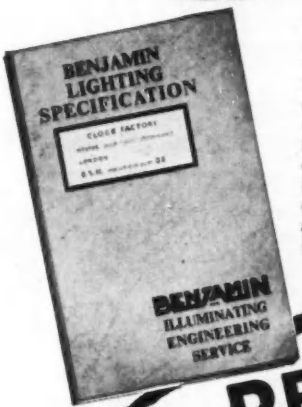

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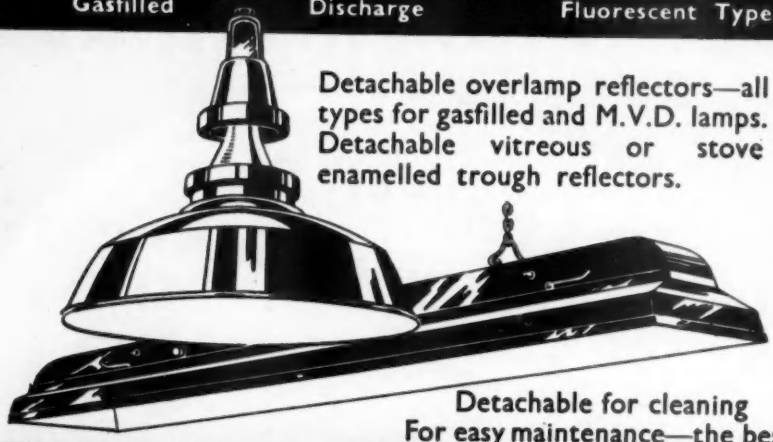

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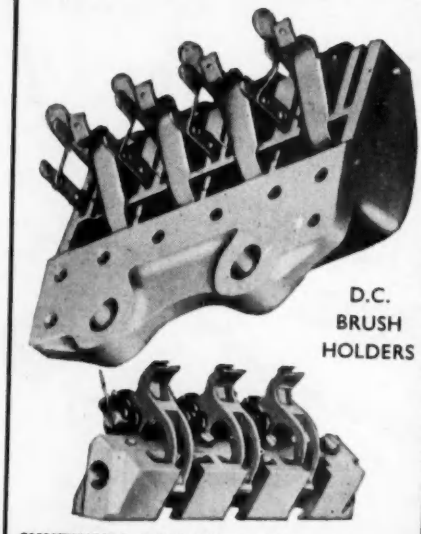

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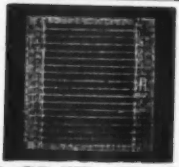

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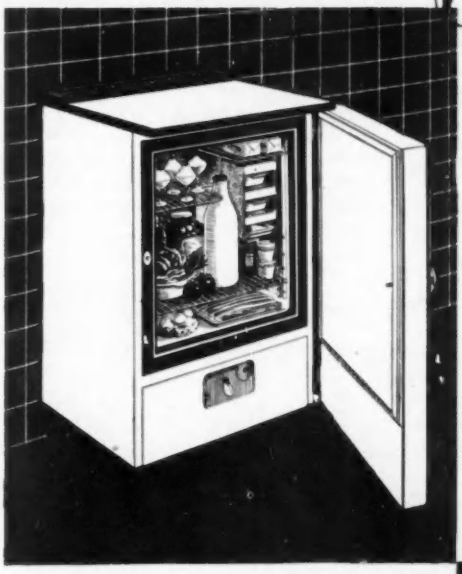
SILENT REFRIGERATOR with—

Capacity **plus!**



SPACE SAVING, FOOD SAVING—Easiclene's *new* 2 cu. ft. silent electric table top refrigerator has ONE-THIRD MORE refrigeration storage space yet fits snugly into any kitchen—even the smallest. And it has so many winning, SELLING ways, it's available in white with grey formica top or cream with green formica top. It's completely silent, trouble-free, costs little to run and gives no interference with radio or TV.

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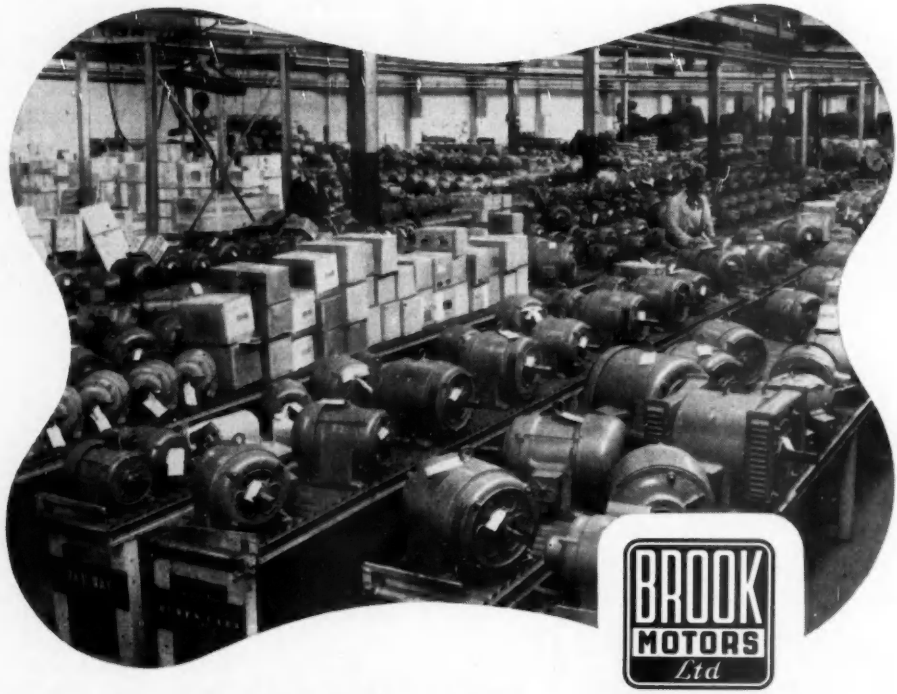

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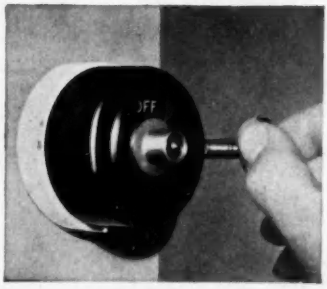

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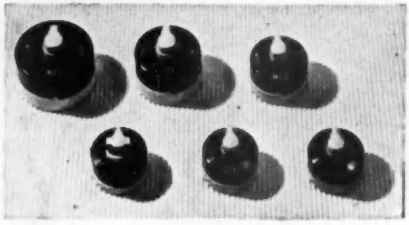

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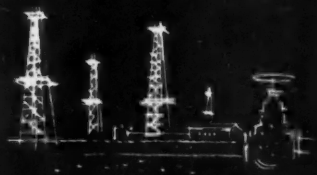

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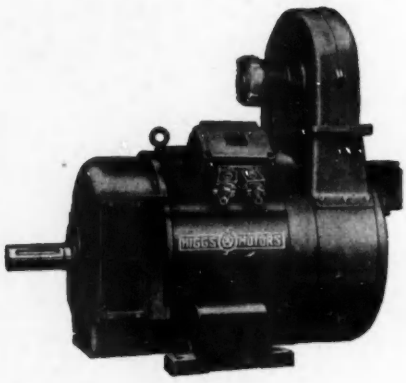

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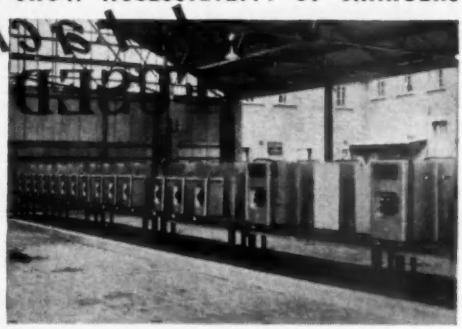

ABOVE: *Westalite chargers at the United Dairies Depot, Lee S.E.*
BELOW: *Installation for P.C.V.s and electric vehicles at Lee*

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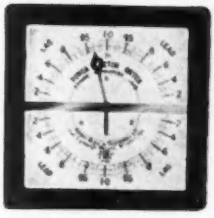

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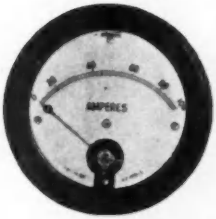

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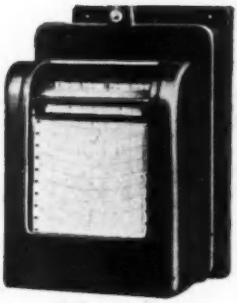
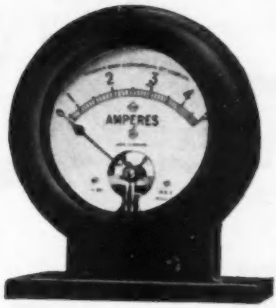


Graphic Recorder



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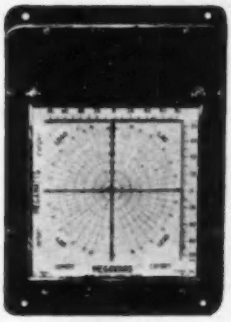

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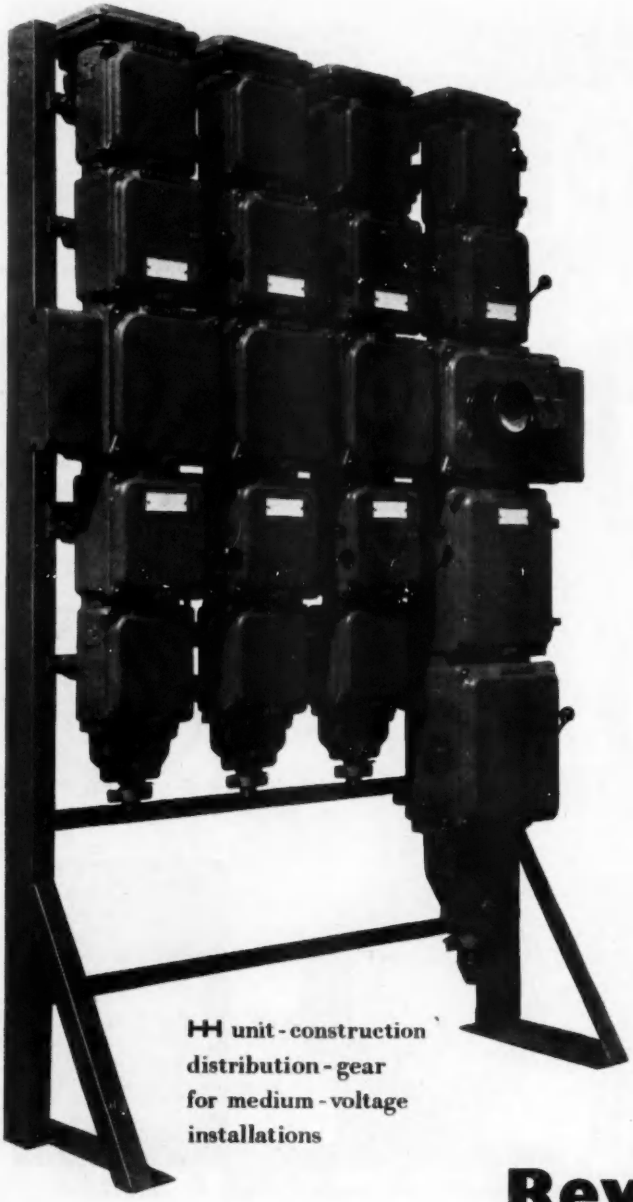

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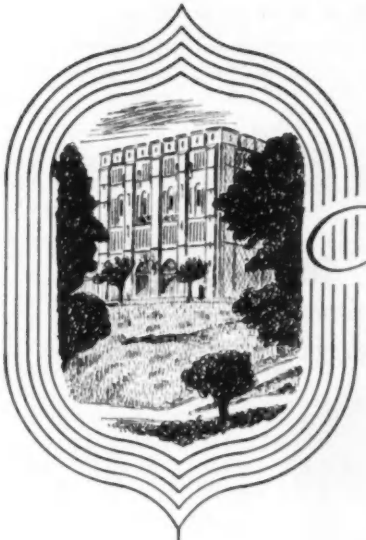

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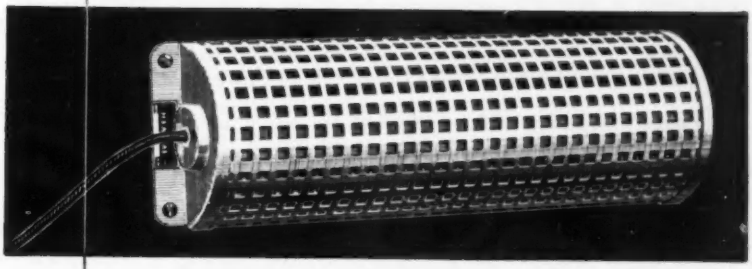

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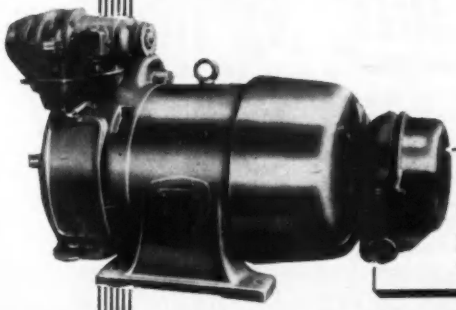

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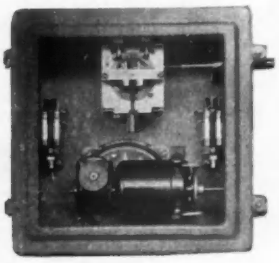

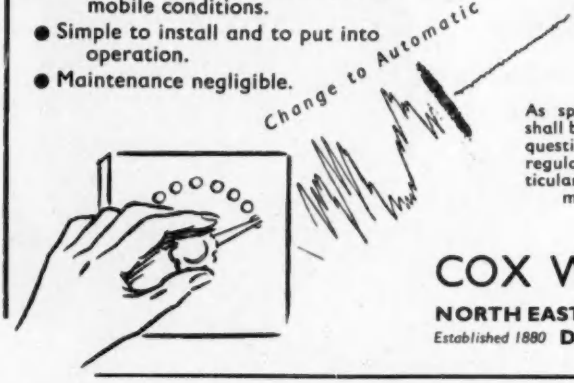

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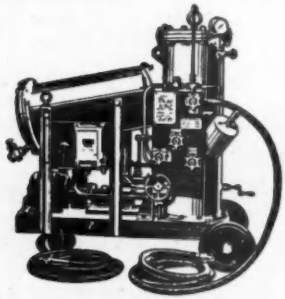
The plant is purely mechanical and extremely simple in operation.



Capacities from 20 gallons to 1,000 gallons per hour.

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132 kV.—ALL TYPES

(Oil filled and Gas pressure)

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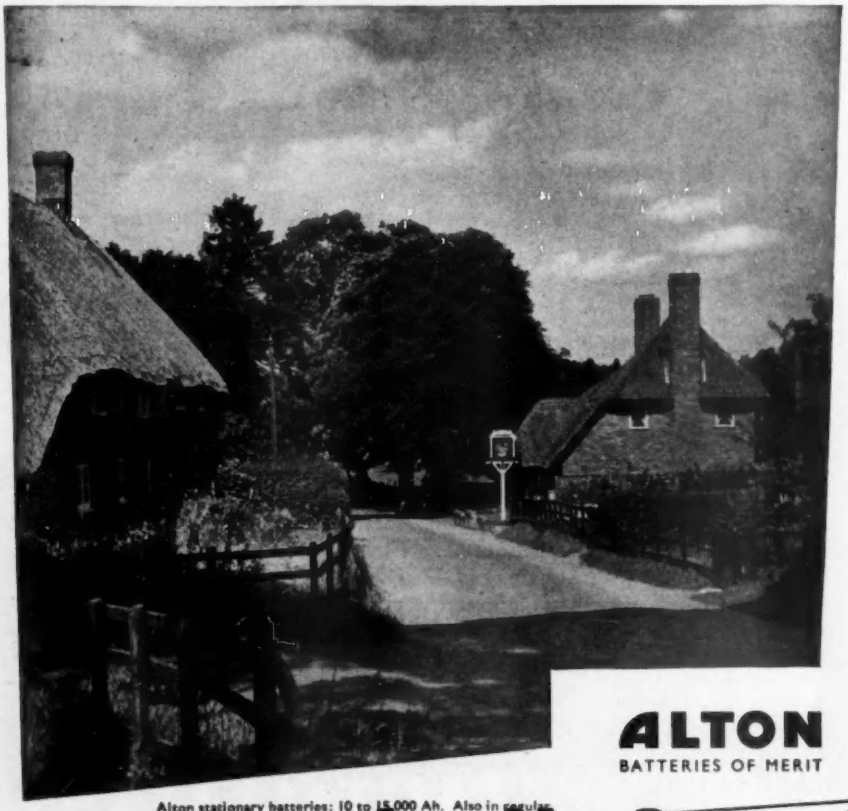
If you worked at the Alton Battery works you'd know it well—and a dozen others like it. You'd know the lanes that lead to each. You'd know the streams—and the fish in them: the pubs and the beer they cool in their cellars, the teas they serve on their lawns. . . . Alton's a country town—and the men it breeds are countrymen at heart. Men with roots in their birthplace. Men with a quiet pride in themselves and the patient skill of their hands. A clipped yew hedge in his garden . . . a battery plate at 'the Works' . . . *making something better than merely well comes very naturally to an Alton man.*



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Alton stationary batteries: 10 to 15,000 Ah. Also in regular production, renewal plates for all makes of batt[illegible] British and Cont[illegible]

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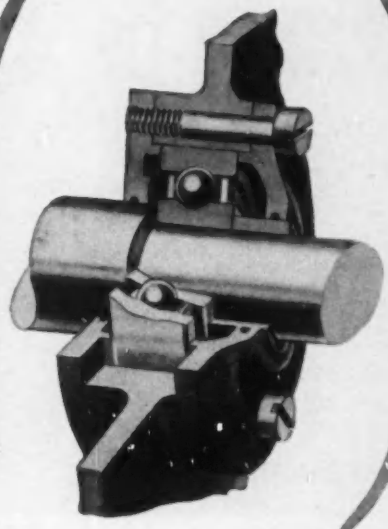

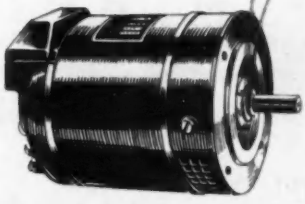

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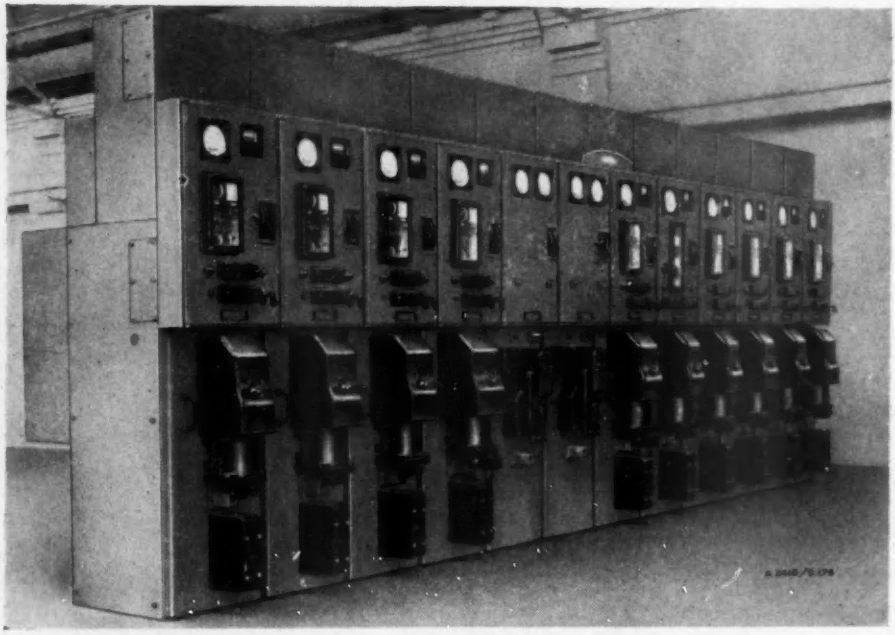

A 12 panel duplicate busbar 2·2 kV. type VA.5 Switchboard installed in a large British steelworks.

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An increase in demand for Brush Heavy Duty Switchgear, such as is required in the modern steelworks, is the outcome of the special attention given by our designers to steelworks service.
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MVA	25	100	150	250	350
VOLTAGE kV.	0.4	3.3	6.6 & 11.0	6.6 & 11.0	6.6 & 11.0

Current Ratings up to 1,200 amperes.

Our increased manufacturing facilities enable us to offer quick delivery of all types of Brush Switchgear and H.R.C. Fusegear.

Write for our new publication No. 41002/1 "Metalclad Switchgear"

Switchgear by **BRUSH**

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B28

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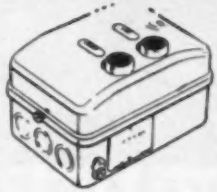

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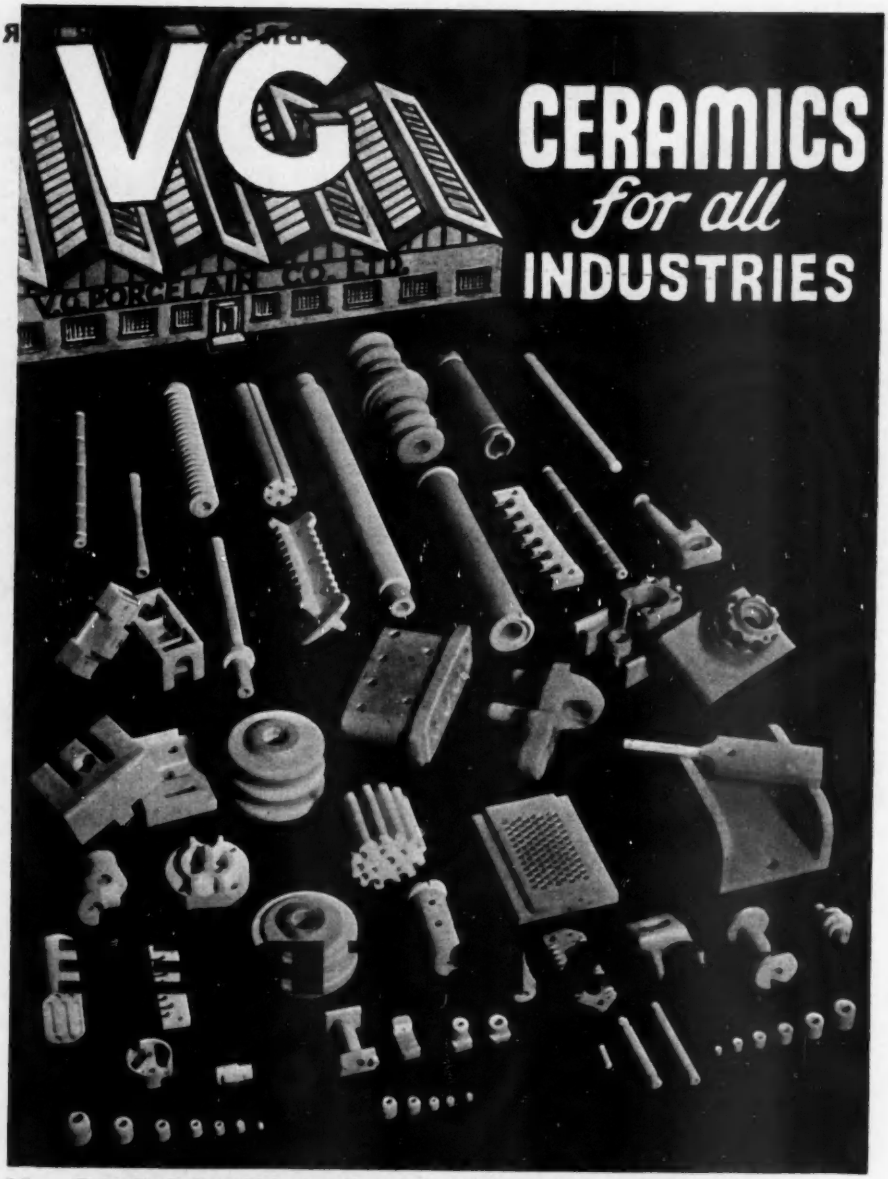

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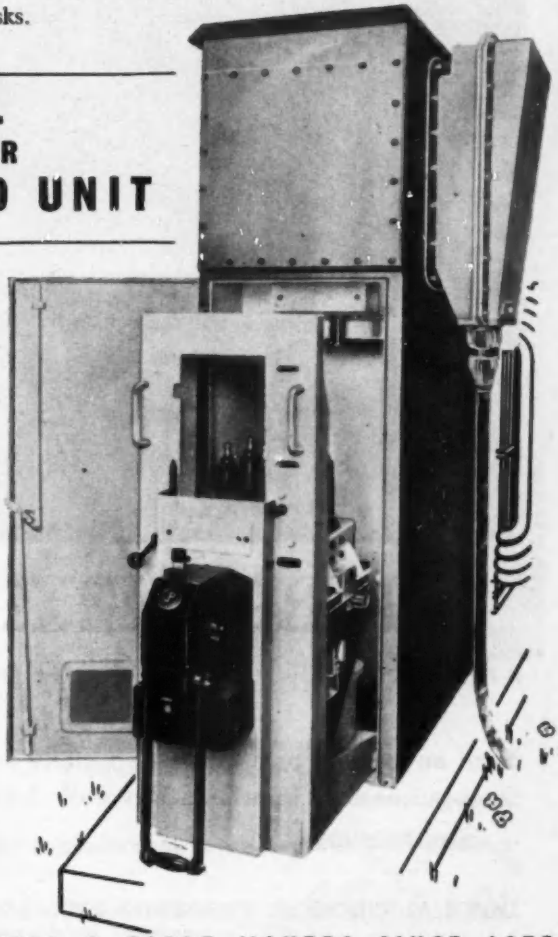
By eliminating the need for sub-station buildings, J. & P. high-voltage Outdoor Metalclad Units, with their weatherproof housings, obviate one of the major expenses involved in the construction of switching stations. They are easily installed on simple concrete foundations and require much less space than would be required by indoor switchgear protected by buildings or kiosks.

No Housing Problems

with the

J. & P. OUTDOOR METALCLAD UNIT



★ **The fixed housings are completely weatherproof. Internal condensation and external rusting are prevented by special protective processes.**

★ **Can be fitted with oil circuit-breakers or oil switches.**

★ **Units are easily coupled together to form switchboards, and can be adapted for ring main service.**

Suitable for use on systems up to 11kV, 15 MVA.

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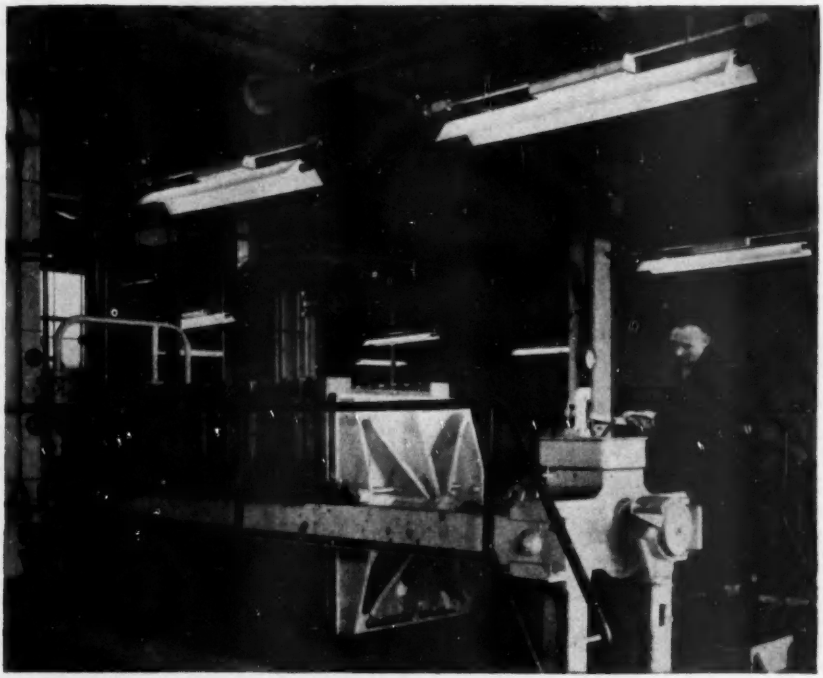

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form an integral part of these specially designed corrosion-proof fittings installed in a large Dyestuffs factory.

'Perspex' is the registered trade mark of the acrylic sheet manufactured by I.C.I.

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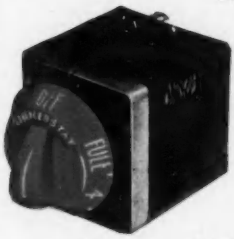
P.P.17

AND NOW!

The Sunvic one-circuit Radiant boiling plate



— and The "Simmerstat"

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the *inevitable* answers to:—

- **Lower first costs**
- **Lower maintenance costs**
- **Lower consumption**
- **Perfect performance for all cooking needs**

Sunvic one-circuit Radiant Boiling Plates are available in 6½" and 8" sizes. Ask for leaflet BP 10.

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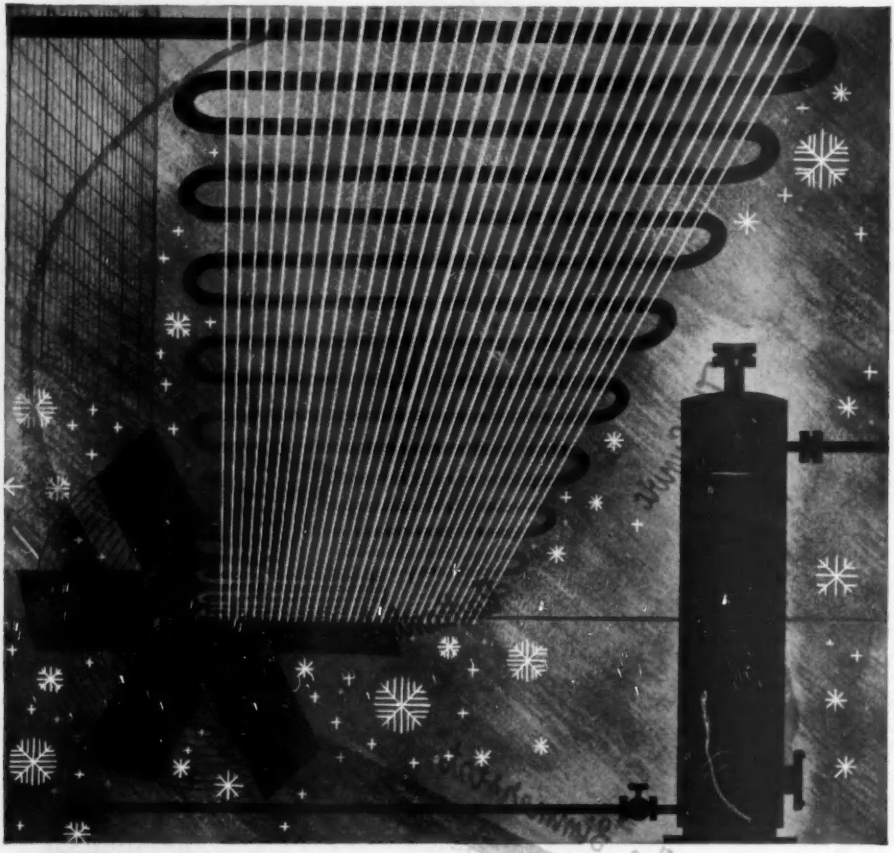

Good Mixers

There are special problems about refrigerator compressor lubrication. Some refrigerants are miscible with oil and if the oil contains wax some of this comes out of solution and is deposited in the delicate controls, upsetting the refrigeration process.

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Shell's laboratories at Thornton, Cheshire, cover an area of 800,000 sq. ft. and are manned by a staff of over 800—that's how Shell makes sure.

SHELL

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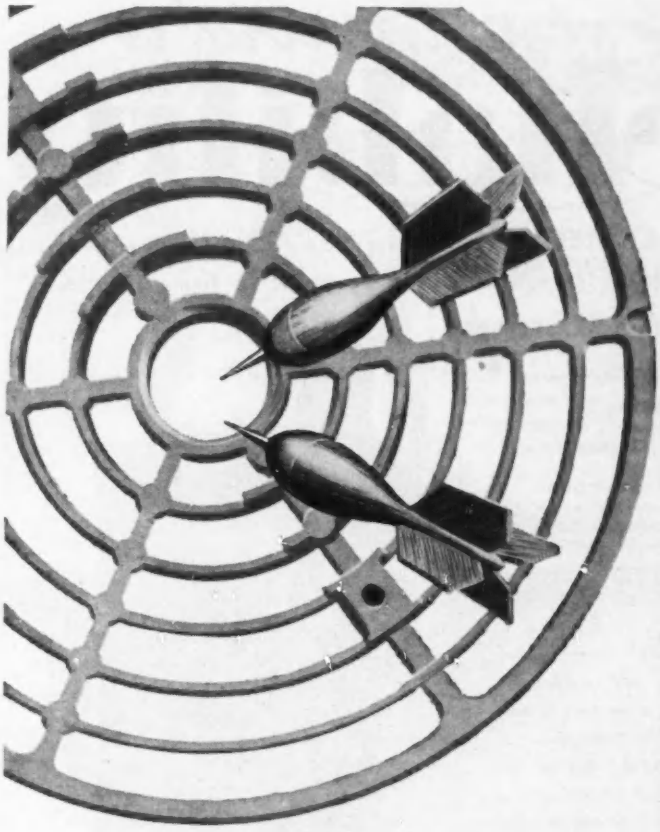
IN LUBRICATION



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CRC 23

the operative word is :—

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because they are made by experts for experts.

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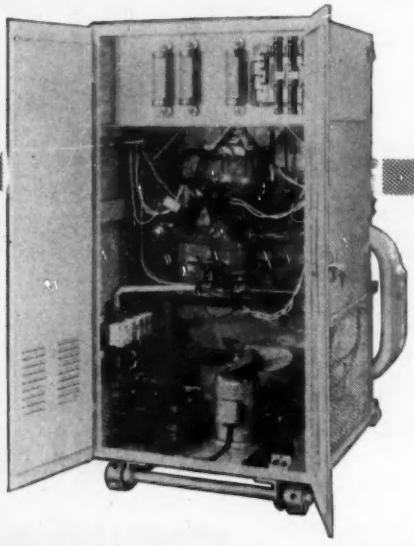
- Metal refining
- Battery charging
- Feeding D.C. motors
- Aircraft engine starters
- Electrostatic precipitation



THERE are many diverse applications for rectifiers, and we make precisely to individual specifications when this is required. One rectifier for electrolytic processing may call for thousands of amps. at only a few volts; another for electrolytic precipitation may demand a few milliamps at many thousands of volts.

What is *your* problem? Our experts will be happy to advise on it . . . always with the one common factor of *reliability* in mind.

RELIABLE DAVENSET RECTIFIERS

● MAKERS OF DEPENDABLE ELECTRICAL EQUIPMENT ●

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DAVENSET ELECTRICAL WORKS, LEICESTER

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Yes, you can — with the new Tricity 528. It is designed for use with boiling plate *and* independent oven, or with two boiling plates at will and can be plugged into any 13 amp. socket. That means immediate use as soon as delivered and NO INSTALLATION cost.

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Here is the full-size streamlined Tricity 528, the new cooker which is converting thousands to Tricity cooking. It's a two-plate cooker with separate grill compartment and independent oven. Vitreous enamel finish *inside* and out. Storage cabinet for pots and pans.

£22 · 16 · 6

Optional extras:
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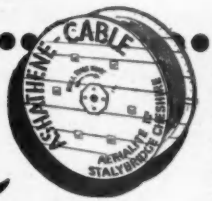
Please send for the Technical leaflet TT/1001, which deals with Ashathene cables.

Ashathene THERMOPLASTIC INSULATED **Cable**



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Metrovick Type MC fuse switchgear provides complete flexibility and ease of assembly. From three standard bus bar chambers, standard fuse switch units, cable fittings and floor stands, any switchboard requirement can be met. All units are supplied jig drilled ready for assembly on site. Type MC fuse switchgear will provide a long trouble-free life and is available from stock. Write for full technical details and price list.

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Member of the AEI Group of Companies.

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meters are matters for

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F.9

See the English Electric advertisement for Electronic Insulation Tester which appears on page 63 of this issue

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It is generally known that base-metal thermo-couple alloys, particularly for high-temperature work, are difficult to manufacture. The really critical period of production is the melting and processing prior to drawing down to finished sizes.

But the precise characteristics required are possible only when there is at every stage, from the initial melt to the finished article, the closest supervision by the same expert people throughout. That intimate control of quality is the reason for the technical superiority of the British-made thermo-couple alloys 'T1/T2', for high temperatures, and 'Special Advance', for the lower temperatures.

'T1/T2' and 'Special Advance'

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MANCHESTER 15

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10, 40 and 80 amperes.

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SMITH METERS LTD · ROWAN ROAD · STREATHAM VALE · SW16
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ELECTRICAL TIMES

Volume 124 No. 3217 2 JULY, 1953

PUBLISHED EVERY THURSDAY

Editor and Managing Director:
ROY BALDWIN
M.I.E.E., Barrister-at-Law

Assistant Editors:
J. K. JOHNSON
B.Sc. (Eng.), A.M.I.E.E.

K. C. POUNDS
B.Sc. (Eng.), A.M.I.E.E., A.C.G.I.

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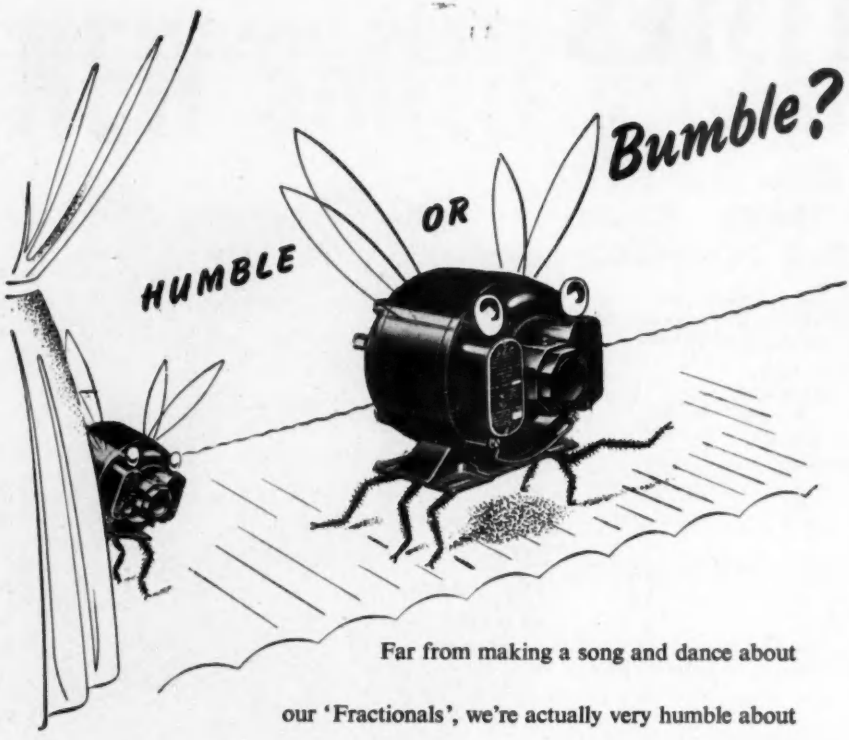


Far from making a song and dance about our 'Fractionals', we're actually very humble about all the nice things said in their praise. And that's no bumble, either! So popular have these busy-bee 'Fractionals' become that if you want to put them on *your* payroll, you had better phone your nearest G.E.C. agent without delay.

G.E.C.

"Fractionals"

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Editorial

P.T. REMISSION ON STOCKS?

EARLIER this year, the report of the Hutton Committee on tax-paid stocks came as an unpleasant shock to the trading community, for it banished, in uncompromising terms, hopes of relief from the losses that are incurred when purchase tax is reduced. The deciding difficulty in the eyes of Sir Maurice Hutton and his colleagues was the impossibility of evolving, to set right an admitted injustice, a scheme which would be equitable to all. Fears were soon confirmed that the Government would find it easy to agree to recommendations involving no loss of revenue. The Chancellor of the Exchequer took an early opportunity of accepting the report and its main suggestions. But now there is hope of some amelioration of the position: during last week's financial debates in the House of Commons some softening of the official attitude was plain. With clear evidence before them that whole industries were being affected by the retailers' natural decision to run down taxed stocks in the pre-budget months, the Government is inclined to think again. This is a second chance that traders must seize—and since electrical concerns, with the higher rates of p.t. to bear, have probably more at stake than anyone, trade associations of the electrical industry can well take the lead. Officialdom must be shown that traders will accept the rough justice of unequal compensation from an administratively simple tax rebate scheme, rather than labour under the continued certainty of a heavier loss. Support within the trade must be rallied to one such scheme, and any search for a patently fair arrangement abandoned, since its complications will be too great to secure acceptance. Then a united demand can be made to the Government for the implementation of the agreed scheme, with some confidence of success.

DANGER FROM FUEL ADVICE

AMONGST the many successful activities of the Coal Utilisation Council in recent years has been the setting up of advisory centres serving the general public in large towns. So far we have considered these to be little more than the solid-fuel counterparts of the showrooms of the two principal competitors for domestic favour. One passage, however, in the Pilkington Report on a National Fuel Efficiency Company makes us wonder if these solid-fuel interests have once again stolen a march on electricity and gas. The Fuel Efficiency Company will have its main interest in industry, yet one obscurely phrased sentence in the report proposes that the Company should also offer advice "to such commercial and other fuel users . . . as are not catered for by the Coal Utilisation Council's activities in the domestic field." This suggestion itself is unexceptional—but the inference held within its phrasing is quite scandalous. It assumes that the C.U.C. Centres are to be regarded officially as the appropriate sources for the householder who wants advice on heating—perhaps as fulfilling that Ridley recommendation for a domestic fuel advisory service in all large towns. Such an assumption cannot pass unchallenged. No one industry can claim to offer the only good and reliable advice on domestic heating difficulties. Electricity service centres are as fully entitled to similar official recognition.

PUMPED PEAKS

PUMPED storage is a means of improving load factor which has been in use for many years, though never on a large scale. Ignoring the case of hydro-electric power and considering an interconnected system mainly supplied by thermal power stations, a pumping plant of this nature can act as

an economical peak-load installation. Relatively cheap energy from base load stations is available for night pumping; discharge through the pump-turbines at peak periods, when less effective high-running-cost thermal plant would otherwise have to be used makes the scheme potentially attractive if suitable sites are available. Recent comparative cost studies, however, show that for the present there seems to be little likelihood that new pump storage stations will be constructed in such thermal systems. The new factor in the situation is the gas turbine, which shows to great economic advantage for meeting short period peaks, and which is, of course, far less demanding in its site needs. Yet the pumped-storage station is by no means a thing of the past. The eventual change-over to nuclear power stations will effect another alteration in the balance of advantage. The high capital charges and low running costs of the power system economy that will then develop, will give additional attraction to any plant that improves generator load factor. Pumped storage may still prove to be the nearest approximation available to the ideal of inexpensive storage of electrical energy in quantities commensurate with supply system requirements.

PROMISE IN THE WIND

ENGINEERS in this country have achieved a notable technical success since the war with their investigations into windpower for electricity generation. An exhibition in St. Albans this week marks another step forward in this progress, and gives occasion to pause and consider where this work is leading. Wind generation can never be a major element in electrical power supply: by the very nature of the plant involved, the output of individual units must remain low. None the less, there is in this harnessing of the wind the prospect of saving coal, needed as urgently as ever, and it has been estimated recently that as much as one million tons of coal may be conserved every year if development proceeds in accordance with present hopes. This prospect provides good reason for a sustained attack on the problems of windpower, always provided that the financial promise of economic generation in comparison with thermal stations is sustained. Test results alone can determine this matter, and it must be kept in mind that all present large power wind generators are essentially experimental. Amenity-sensitive country lovers will probably cavil at the large strings of generators necessary for power production on a worth-while scale, but they should be brought to understand that a wind-tower in one place is a valuable aid to better living conditions in many areas throughout the country.

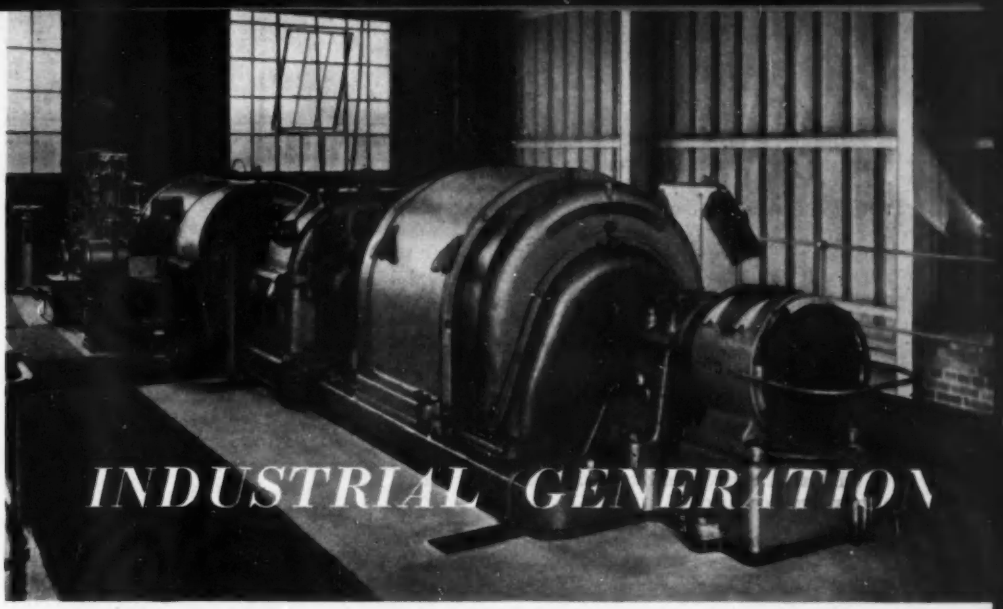
THE TRUTH OF SOLID FUEL

OVER the past 18 months the ELECTRICAL TIMES has been continually drawing attention to the misleading claims made by enthusiasts on behalf of solid fuel for domestic use. While the scientists concerned have not joined in this anti-electrical hunt, their results have been taken out from the context, exaggerated and misapplied in an effort to influence national fuel policy, a matter in which there has been some success. A cold douche is now provided for such supporters in the survey of Government Fuel Research for 1952, which we reprint below.

"It is clear that the improved fire is not intrinsically of higher thermal efficiency than the stool bottomgrate. The provision of a combustion control, however, puts the solid-fuel fire more nearly into the class of the electric and the gas fire. It is possible, by the use of the control, for the householder to match the output of the fire more nearly to the hour-by-hour requirements of heat. Thus fuel may be saved, not by its more efficient utilisation but by avoiding waste. Just how effective this potentiality may be is not a matter which can be decided on the test-bench; it requires to be studied under actual living conditions in occupied houses."

No more concise representation of the position could well be given. The facts will not be new to our readers but here is a broad summary with a useful official label.

Meteor



INDUSTRIAL GENERATION

Costing and efficiency calculations for power stations equipped with pass-out turbines

By F. J. HALLIGEY, A.M.I.E.E., A.M.(S.A.), I.Mech.E.

MUCH has been written on the subject of the economies possible in the generation of power and process steam for industry when a combined power plant, utilising back-pressure or pass-out turbo-alternators is employed, as compared with the alternative of purchased power and the installation of low pressure boilers for direct generation of the process steam. It has been estimated that an overall thermal power plant efficiency of over 80% can be achieved by a fairly large combined station, and 65% to 70% by a small station of the order of 150 kW output—provided the electrical load is equal to, or less than, that which can be generated by the process steam requirements. If the electrical load is more than that which can be generated by the process steam, some additional steam will have to be admitted to the turbine, and this extra steam will then be disposed of through a condenser; in such a case overall thermal efficiency will fall owing to the condenser losses. In many cases, probably the majority, the demands for steam and power will vary more or less independently, and it will often be found that the maximum demands for the two forms of energy do not occur simultaneously; the condition then arises that at some times the process steam in its passage through the turbine can generate all the power required, whereas at other times there may be either a surplus or a deficiency of steam with reference to the demand for power.

General Economic Problem

The costs and efficiencies over a period are naturally, in a practical case, only calculable on a basis of average figures, and the allocation of overall costs between steam and power become much more involved than in the case of a "straight" condensing station run for the generation of power only, combined with an installation of low pressure boilers used for process steam only. In the case of some industrial processes the cost of power and steam represents a very large proportion of the overall factory production costs, whereas in others the cost, although a small proportion of overall costs, is large enough to repay investigation in detail. Generation costs are increasing, and the time is therefore opportune for examination of a simple method for the accurate comparative costing of privately generated power and steam supplies.

Steam for industrial processes is generally required at comparatively low pressures and temperatures, ranging perhaps from 10 to 200 lbs/sq in. at saturation temperature. If the electrical power demand would at all times be sufficient to absorb the whole of the energy

available in the steam passing through the turbines (i.e., if there are no condenser losses), then there will be no advantage in the installation of boilers producing steam at temperatures and pressures very much higher than those required for process, and back-pressure turbines will be utilised. On the other hand, if process steam demand is insufficient to allow the power demand to be satisfied at all times, and pass-out turbines with condensers have to be installed, there is generally an advantage in the installation of high pressure boilers so that high initial steam conditions can enhance overall thermal efficiency as far as the condensed steam is concerned. It is a power plant of the latter variety which will now be more particularly considered.

Pass-out or Extraction Turbines

The process steam required is obtained in such a case through one of the many possible varieties of turbine in which the steam is drawn off the cylinder at some point between admission and exhaust. Turbines can be arranged to pass out steam at several different pressures by arranging the appropriate number and positions of tapping points : but unless the mechanical load on the shaft is constant, together with the quantities of steam passed out at the different tapping points, the pressures obtained for the process steam mains will vary. These variations in pressure can be overcome by the installation of pressure control valves at the tapping points, the valves being mechanically coupled to the turbine speed governor, but governing becomes difficult if the number of controlled pressure pass-out points exceeds one. Generally, therefore, steam conditions in the pass-out mains will be much more constant if the pressure-controlled pass-out system is used, as opposed to the "bled" steam system, a word which is usually understood to imply that the pressure of the steam is not controlled at exit, but varies with the power load.

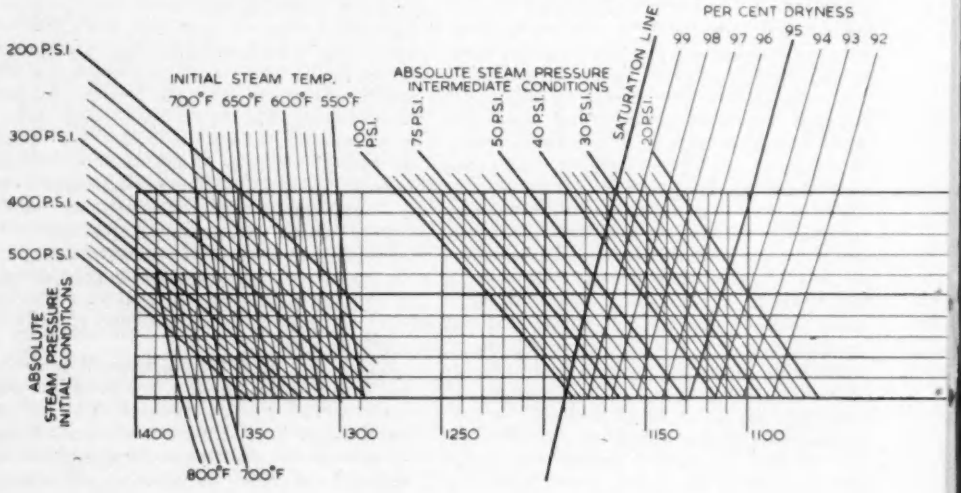
Calculating Cost and Efficiency

So that a check can be kept of the proper running of the plant, it will be necessary to calculate at least the overall thermal efficiency, the boiler house efficiency, and the turbine house efficiency; and in addition, so that the factory processes can be accurately debited with their share of consumption, the cost of production of one unit of power and one pound of steam will have to be calculated. For this purpose the following figures will have to be known :—

(1) Fuel burnt for power generation.
(2) Fuel burnt for process steam generation.
(3) Proportion of capital costs to be debited to power generation.
(4) Proportion of capital costs to be debited to process steam generation.
(5) Proportion of running costs other than fuel costs to be debited as in (3) and (4).

With regard to items (1) and (2), it is evident that the proportions of fuel burnt towards power and steam supply will bear the same

Fig. 1. Heat-Entropy diagram for steam. Plotted from the 1939 Callendar steam tables



ratio as the heat energy input to the turbine, less the heat energy in the process steam, bears to the heat energy in the process steam, and these proportions can be readily ascertained by means of a Mollier diagram (Fig. 1) using a method which will be explained below.

Dividing the Costs

It is not a simple matter to divide up the capital costs into two distinct headings (Items (9) and (10)), but on examination of the power plant, it will be found that certain portions (for example, alternators, switchgear, main cables) are installed wholly for the production of electrical power, while other portions (process steam pipes, reducing valves, etc.) are installed wholly for the production of process steam; but by far the greater section of the plant is installed jointly for the production of power and steam. Again, with regard to the invariable running costs (salaries, wages, lubricants, etc.) it can usually be fairly assumed that there should be a division of almost every item between power and steam production.

When dealing with this division of costs, the accountancy department is frequently in error in allotting the whole of the capital cost of (say) the turbine house to the generation of power, and perhaps the whole of boiler house costs to process steam. It is not a simple matter to judge exactly what proportions of the various items should be allotted to power and process steam costs, but in the opinion of the writer a reasonable division will be achieved by dividing the cost of all joint items in the proportion of the heat energies used to find the relative fuel burnt for the two purposes. This is the same as dividing the costs in proportion to the fuel burnt, and means that only fuel consumption figures need to be forwarded to the accountancy department as a basis for cost division.

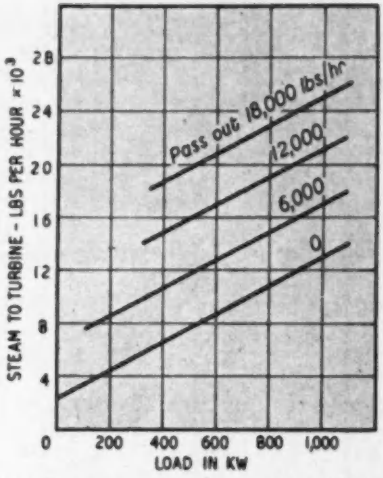


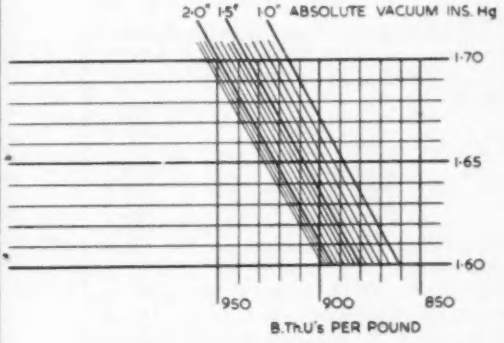
Fig. 2. Steam consumption curves for a 1,100 kW pass-out turbine. Conditions at stop valve are 350 lb/sq in., 650° F. Vacuum 26·4 in. Barometer 28·65 in.

Heat Drop

It is well-known that the efficiency of a steam turbine can be assessed by measurement of the heat drop taking place in the steam between admission and exhaust, and if adiabatic expansion be assumed, this heat drop can be readily ascertained with the aid of a Mollier diagram.

Referring to Fig. 1, steam expanding adiabatically from any initial conditions will follow in the course of its expansion a horizontal line corresponding to a constant entropy; consequently, if the initial temperature and pressure are measured, the heat drop corresponding to any intermediate condition, or to the final vacuum condition, can be read off the chart directly. In the case of a pass-out turbine arranged to supply process steam, the whole of the boiler output will enter the turbine; a portion will be passed out after having done some work on the turbine blading, and the balance will travel on through the low pressure blading and will be exhausted at a pressure corresponding to the condenser vacuum. By means of the Mollier diagram, the heat drop between inlet and pass-out conditions can be read off, and the energy extracted from the steam before it is passed out can be calculated.

This continuation of Figure 1 takes the Heat-Entropy diagram down to vacuum for overall calculations



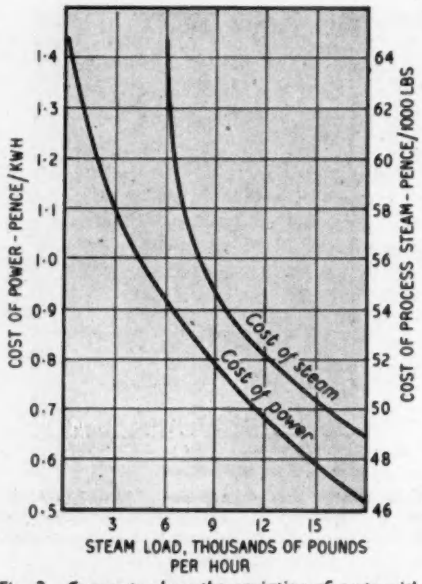


Fig. 3. Curves to show the variation of costs with constant power load and variable steam load. Power load is 800 kW

Engineering Calculations

Table 1 indicates the steps necessary to ascertain the figures to be used in the calculation of all efficiencies and other required information over a period of 28 days. This period was chosen to correspond with the period used for production costing in the factory in question, which was built together with its own small steam power plant in South Africa during the years 1947-1949.

Of the figures in this table, the ratios denoted "P" and "G" are those controlling the allocation of fuel burnt and costs between power and steam generation, whilst the energy figures are used directly for efficiency estimations. For the period covered, the overall efficiency of the power plant, which is given by the formula

$$\frac{(3412 \times \text{USO} + \text{TPE}) \times 100,}{\text{C} \times \text{CV}}$$

is found to be 34·6%, and considerably higher efficiencies would be found to obtain at higher load factors, the load factor over the period being 45%. It will also be noted that overall efficiencies will increase as the proportion of process steam supplied, to the quantity of total steam generated, increases.

TABLE 1.—STEAM AND POWER PRODUCTION SUMMARY FOR 28-DAY PERIOD

(a) Metered and Observed Quantities:—

ITEM	28-DAY TOTAL OR AVERAGE	SYMBOL
Coal burnt	1,163,220 lb	C
Coal calorific value	12,000 B.Th.U./lb	CV
Units generated	305,550 kWh	UG
Station auxiliary units	54,250 kWh	SU
Units sent out	251,300 kWh	USO
Process steam sent out	3,364,670 lb	PS
Generator condensate	3,974,550 lb	M
Boiler evaporation	7,450,000 lb	E
Average steam temperature	643° F	
Average steam pressure	383 lb/sq in. abs.	
Feed water temperature	192° F	
Average condenser abs. vacuum	1·16 in. Hg.	
Average pass-out steam temperature	307° F	
Average pass-out steam pressure	75 lb/sq in. abs.	

(b) Calculated Quantities:—

ITEM	DERIVATION	QUANTITY	SYMBOL
Energy in steam at inlet	Mollier Diagram	1,334 B.Th.U./lb	SE
Energy in steam at pass-out	"	1,179 "	PE
Energy in vapour in condenser	"	870 "	CE
Energy in feed water	192 − 32	160 "	FE
Total energy in steam at inlet	E × SE	$9,940 \times 10^6$ B.Th.U.	TSE
Total energy in P.O. steam	PS × PE	$3,960 \times 10^6$ "	TPE
Difference—Input to power generation		$5,980 \times 10^6$ "	TGE
Condenser rejects	M × CE	$3,458 \times 10^6$ "	
Difference—Energy available for power generation		$2,522 \times 10^6$ "	TAE
Energy in feed	E × FE	$1,081 \times 10^6$ "	TFE
Ratio of heat energy in process steam to total heat energy generated	$\frac{\text{TPE}}{\text{TSE}}$	0·398	P
Ratio of heat energy input to power generation to total heat energy generated	$\frac{\text{TGE}}{\text{TSE}}$	0·602	G
Coal allocation to process steam	P × C	463,000 lbs.	PC
Ditto to power generation	G × C	699,000 lbs.	GC

TABLE 2.—COSTING SUMMARY

ITEM	DERIVATION	TOTAL COST
(a) *Capital Costs*	Allocation "X"	£7,000
	" "Y"	£2,000
	" "Z"	£115,000
(b) *Costs over 28-day period*		
Fuel cost	Coal at 32s. 6d. per 2,000 lbs.	£944
Water cost	500,000 gallons at 9d. per 1,000	(say) £18
Total variable running costs	(Cost "A")	£963
Total invariable running costs	Stores, wages, etc., for the period (Cost "B")	£680
Power Costs		
Variable running costs	A × G	£580
Invariable running costs	B × G	£410
Capital charges	0·00767 (X + Z × G)	£586
TOTAL costs for power over period		£1,576
Unit cost of power (units generated)		1·24d.
Process steam share of station auxiliary units ...	54,250 × P	£112
Cost thereof at 1·24d.		£1,464
Total cost of power sent to factory	£1,576 − £112	1·40d.
Unit cost of power sent to factory		
Process steam costs		
Variable running costs	A × P	£382
Invariable running costs	B × P	£270
Capital charges	0·00767 (Y + Z × P)	£366
Cost of station auxiliary units		£112
TOTAL costs for process steam over period ...		£1,130
Unit cost of process steam, pence/1,000 lbs. ...		80·5d.

Costing Calculations

The total cost of operating a power station of this nature is made up of the following items :—

(1) Running costs which vary directly with output (such as fuel and water) .....A
(2) Running costs which do not vary appreciably with output (such as stores, maintenance, wages) ..... B
(3) Capital Charges. These can be subdivided :—
  (3a) Charges to the account of power production X
  (3b) Charges to the account of process steam production .....Y
  (3c) Charges common to both steam and power production .....Z

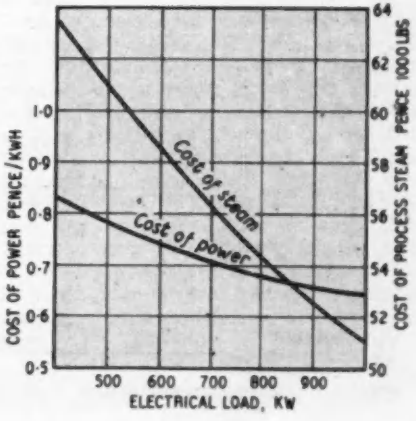
In the case of the plant under discussion, the capital cost allocations under the above headings, reduced to round totals, were as follows:—

	ALLOCATION X	ALLOCATION Y	ALLOCATION Z
Buildings			£30,000
Boiler plant ...			£50,000
Turbine plant			£35,000
Switchgear ...	£7,000		
L.P. steam pipework, etc. ...		£2,000	
Totals ...	£7,000	£2,000	£115,000

Opinions differ with regard to the correct interest and redemption figures to allow for capital expended on power plant. It is necessary to assume a useful life for the plant, to take into consideration the state of the money market at the time the capital is raised, and in the case of industrial plant decision is often influenced by taxation law. For the sake of illustration an overall of 10% per annum will be used here, involving over a 28-day period a conversion factor covering interest and redemption of $\frac{10}{100} \times \frac{28}{365}$, or 0·00767. With this assumption, and dividing the costs common between power and process steam according to the ratio G to P, the total costs and thence the unit costs can be ascertained as follows :—

Variable running costs for power = A × G
Variable running costs for process = A × P

Fig. 4. Curves showing variation of costs with constant steam load and variable power load. Steam load is 12,000 lb/hr.



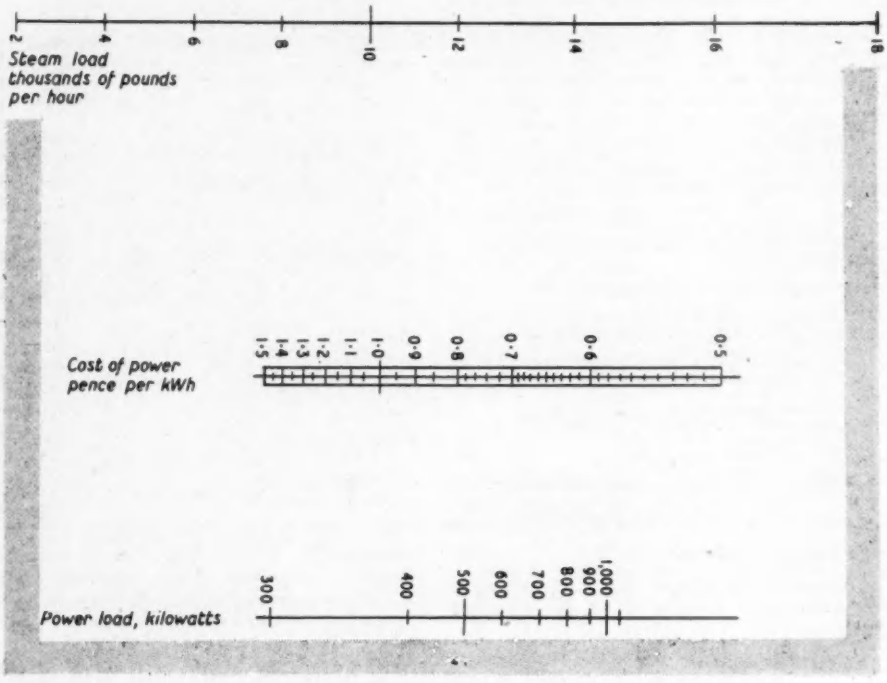
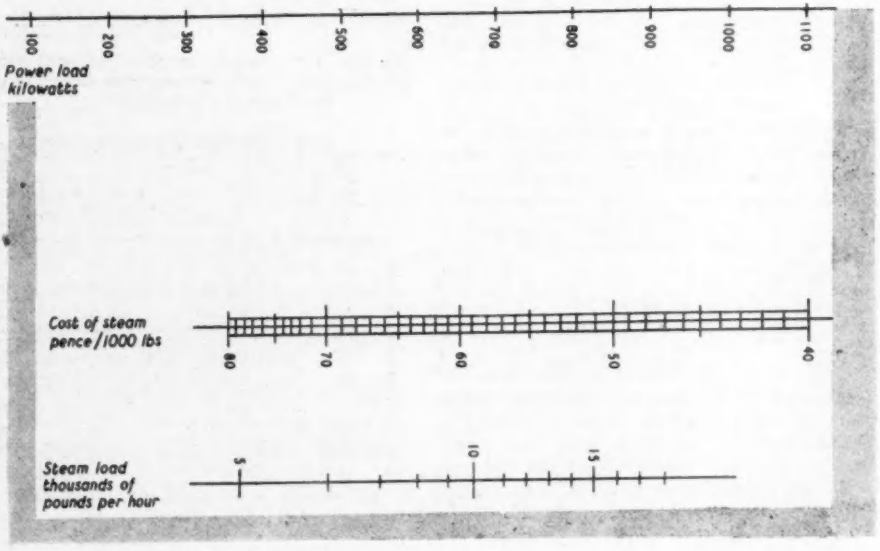


Fig. 5 (top) Nomogram illustrating variation of power costs with electrical load; Fig. 6 (bottom) Nomogram giving variation of steam costs with load



Invariable running costs for power .....B × G

Invariable running costs for process steam .....B × P

Capital charges for power..... 0·00767 (X + Z × G)

Capital charges for process steam..... 0·00767 (Y + Z × P)

This is developed in detail in Table 2.

Forecast of Costs at Any Load

Curves giving the total steam consumption of a turbine with any combination of power and pass-out steam output are generally supplied by the makers, and using this information it is possible to forecast the unit costs of power and steam by estimating the coal consumption of the boilers at the total load desired, and following through the procedure indicated in Tables 1 and 2.

Figure 2 is a reproduction of a series of such steam consumption curves applying to one of the pass-out turbo-alternators installed at the station to which the previous figures apply, and using this information the curves shown in Figs. 3 and 4 and the nomograms in Figs. 5 and 6 were prepared. These curves and nomograms would of course, only apply to a time when this particular turbine or one of the same size and type was on load, but they can easily be drawn for other machines and would doubtless prove useful in production planning.

The only aspect of the method of costing outlined that may prove puzzling to the accountancy department is that the capital cost allocation to power and steam will vary monthly, although this doubt should soon be resolved when it is pointed out that the total capital charges for the whole of the power plant and buildings is invariable, and that only the proportions charged to the two different forms of energy output change according to the relative loads.

Our readers' views . . .

Concrete and Conduit

I HAVE read 'Megohm's' notes with considerable interest, but gather he is inclined to question whether flexible non-metallic conduits can be run in concrete as cheaply as can t.r.s. cables laid direct. In the first place, non-metallic conduits are not all that more expensive than steel conduit, and if the 10% wastage associated with the latter be taken into account there is very little difference.

Direct-buried t.r.s. or similar systems are usually protected here and there by means of steel conduit, requiring bushings, wall chasing, etc., and the labour aspect looms up. The proof of the pudding is, however, in the eating, and I have before me a copy of a letter written from the installation department of a district of an Area Board to a third party, one sentence of which reads as follow: ". . . in blocks of flats and in houses which have pre-cast or solid floors the Gilflex system affords a saving over t.r.s. of about 10% where the latter would have been protected where run under plaster." I shall be pleased to give 'Megohm' the source of this opinion in confidence, if he is interested and will write me direct.

I thoroughly agree with 'Megohm's' final paragraph, and would suggest that there is one way in which economy, coupled with a gain in efficiency with the accomplishment of a draw-in system, may be ensured.

T. C. Gilbert

FOLKESTONE, KENT.

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Electric Razors

I HAVE read with interest the two letters appearing in your issues of 21st and 28th May under the heading "Electric Razors—and Safety."

As a Company we have realised for some time not only the inevitable difficulties American and Continental visitors are faced with when staying in British Hotels, but also the undesirable practice from a safety point of view of using a variety of adaptors. To this end, therefore, we have manufactured a multi-outlet variable voltage socket which not only takes any standard Continental and American plug, but also offers three voltages. This socket is designed exclusively for use with electric dry shavers and is fused accordingly. Its growing use by hotels we think offers an answer to the questions your correspondents raise.

C. A. F. Shapcott

CHILTON ELECTRIC PRODUCTS, LTD.

Wiring History

MR. MELLANBY'S articles have been so interesting that one could have hoped more space had been allotted to make them more exhaustive.

The caption under the illustration of the tumbler switch on page 1189 is, however, hardly correct as the picture appears to be of the original Tucker 136.b quick make and quick break type. This was popular *before* the first World War but even then the idea of a special mechanism for a.c. was in the air.

I think it must have been very early in 1913 that a sample of the 136.b was sent to the Rugby Electricity Department for comment and in reply the Engineer made two observations:

(1) that a movement which relied entirely on a spring for its operation was bad mechanics, and

(2) that as a.c. would in the not too distant future be universal the spring should have been employed to retard the break instead of accelerating it.

Point (1) was met during the first World War when the switch was entirely re-designed and given a new number B150 in which a completely positive action was incorporated enabling the switch to be operated effectively (though not rapidly) even when the spring was removed entirely.

Point (2) rather shook the late Mr. J. H. Tucker and his renowned design chief, but as they could get no confirmation elsewhere for such a revolutionary contention nothing was done about it and it was not until the late twenties and early thirties that Mr. J. B. Tucker started to investigate a.c. principles as applied to tumbler switches.

Although it subsequently became known that Mr. Ritchie of the Wandsworth Co. and Mr. Pegg of Lundberg's were working to the same end, I think it is correct to say that the first range of a.c. tumbler switches to be offered for general sale was that in the 1935 Edition of the Tucker catalogue.

S. A. Millington

KINGS NORTON

Fuel Research during 1952

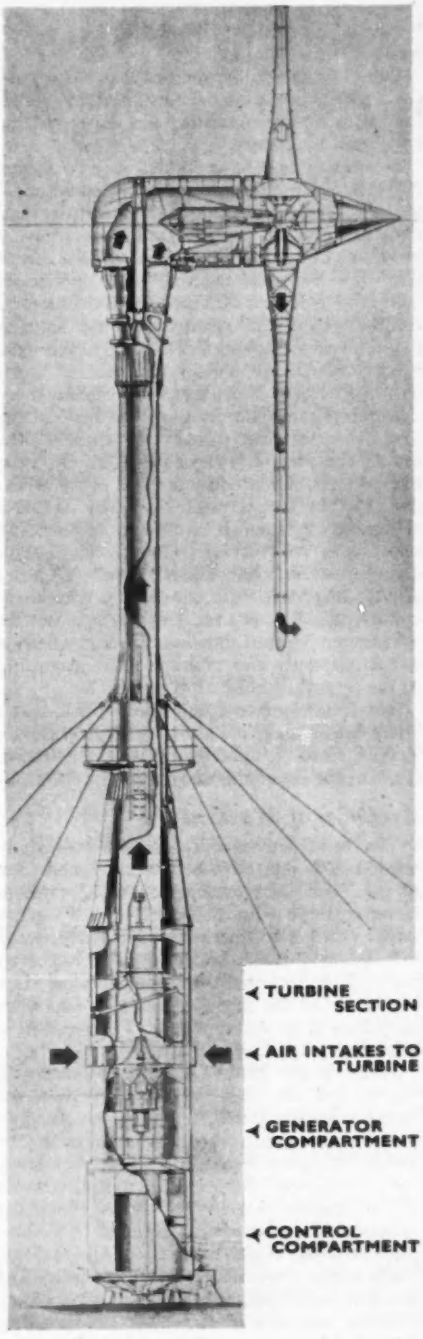
BOILER availability investigations figure prominently in the report of the Director of Fuel Research for 1952. Humidification of the primary air is mentioned as reducing the amount of external deposits at some stoker fired stations. It is suggested that with stoker firing, an important factor in deposit formation may be the volatilisation of silican contents from the fuel beds, this action being reduced by humidification. Other tests have shown that the effect of the volatile alkali content of coal is likely to be a less serious factor with pulverised fuel firing than with stoker firing. However, there is some doubt about the effect of calcium contents, and the formation of bonded deposits in p.f. boilers is now being investigated with particular reference to the relative importance of alkali and calcium compounds in the coal.

Amongst several items of gas turbine research mentioned in the report, one of the most interesting concerns the open cycle turbine using solid fuel. In this it is necessary to clean the hot gases before they are led to the turbine, and two proprietary dust-extraction units are being tested on the hot gases from a straight-through combustion chamber. One is a multi-cyclone unit and the other a modern form of single cyclone. Both are constructed with heat-resisting steel.

Investigations into domestic heating have concentrated on methods of testing the improved open fire. One result of this has been the emphasis on the point that the "improved" fire is not intrinsically of higher thermal efficiency than the stool bottomgrate. Its advantage lies only in its controllability. It is also recognised that test bench investigations are of little use in determining the effective value of this latter characteristic. Indeed, it is explicitly recognised that laboratory work cannot solve all the difficulties of evolving a concept and definition of "efficiency" as applied to domestic heating.

Coal Constituents

For different reasons, the occurrence of vanadium and germanium in coals is of growing interest at the present time. Investigations on a number of samples from all the main British coalfields show that the average vanadium content is between 1 and 10 p.p.m. of pure coal substance. The latest information on germanium is that the content in coals from South Wales tends to be low.



POWER FROM THE WIND

New 100 kW Unit

sets Theme for Special Exhibition

OF all forms of motive power, the utilisation of the wind is probably the oldest, going back, as far as ship propulsion is concerned, into the mists of antiquity. In recent years, in view of the possible foreseeable exhaustion of the "natural" fuels such as timber, coal and oil, attention has again been directed to the wind, but this time as a means of electricity generation. Abroad, several plants have been built. At Yalta, in the Crimea, a 100 kW power unit was erected in 1931, but is believed to have been destroyed by the Germans in 1944. The Americans, who designed a 1,250 kW machine (which was ultimately abandoned due to extensive mechanical failure) and the Danes who have several wind power plants, have provided much fundamental data on the subject. On the basis of this information, and taking into consideration the modern advances in aerodynamic design, the British Electricity Authority thought that further investigation into the problem was justified. One of the plants resulting from this decision is now nearing completion, and is being erected near St. Albans to undergo trials.

Engineered by Enfield Cables, Ltd., with the active co-coperation of de Havilland Propellers, Ltd., and the English Electric Co., the project which we were able to examine on Monday is an interesting example of industrial co-operation. This 100 kW plant, ordered by the B.E.A., may well be the forerunner of several such plants for use abroad where the supply of electrical power presents even greater problems than those obtaining in this country.

Operating Principle

Most of the previous designs of wind-operated generators had been built on orthodox lines, with a generator driven from the propeller via gearing. This technique although simple in theory presents many disadvantages. Shock loading of the propeller with consequent high stresses meant a heavy and powerful structure; rigid connection between propeller and generator also led to synchronising and operating difficulties, and the weight of shafting

and gears presented a constructional problem.

It was, therefore, decided to adopt a principle which had been investigated by Monsieur Andreau in France. This principle uses hollow blades with tip vents exhausting to atmosphere. Rotation of the blades hurls air out of the tips by centrifugal force. Replacement air is sucked in through the base of the tower via a wind turbine, directly coupled to the generator. Although, at first sight, this system would appear to be most inefficient, tests have shown that in fact it provides a conversion efficiency not much less than that of the geared wind generator. At the same time, the mechanical advantages are considerable.

Owing to the fact that the air turbine runs on a pressure difference between a partial vacuum and atmosphere, this principle is known as the "depression" system.

The Enfield Machine

The Enfield machine, now being erected at Prae Wood, was in fact developed from first principles by a team of engineers working at de Havilland Propellers, Ltd., on behalf of Enfield Cables. The tower height of 100 ft to hub includes a ground compartment for the switchgear and protective equipment, a section of the same diameter immediately above where the induction generator is housed, and above that again the axial flow air turbine. At the top of the tower is the propeller system with an automatically operated adjustable pitch mechanism which maintains the speed of rotation constant at 95 r.p.m. between wind speeds of 30 and 65 m.p.h. The diameter of the swept circle is 80 ft and the two-bladed propeller orientation is power-assisted and controlled.

Made by English Electric, the generator is rated at 100 kW, 415 V, and is started as an induction motor. When synchronous speed is approached, direct current is fed into the field from a direct driven exciter, thus causing the machine to run as a synchronous motor under no-load conditions. Air is then admitted to the turbine and the "motor" begins to generate and feed into the connected a.c. system. Fully automatic control gear is connected to the generator by flexible armoured cables. The axial flow, single-stage, 48 in. dia. wheel turbine handles 50,000 cu ft (or about 1.75 tons) of air/min.

Using the Output

Owing to the variable nature of the output, in areas where a large interconnected system is not available, means have to be found to utilise this output to the highest efficiency. To illustrate this, an exhibition is being held at Prae Wood to show various means of obtaining "storage" in addition to illustrating the development of the windmill.

Desert irrigation by pumped water is a possible useful proposal as illustrated by Sumo Pumps, while for emergency is a diesel-electric 8 kW unit by Listers.

Steam can also be generated in an Autolec (G.W.B. Electric Furnaces) boiler and with the aid of a steam accumulator (The Steam Storage Co.) can provide a most useful operation in providing both power and heat. Water electrolysis and batteries, together with appliances using the hydrogen obtained from the former, can be examined. A small electric lighting plant, an earth-moving tractor and scraper and a gas cooker are shown modified to burn hydrogen. Soil warming, space heating by thermal storage, sterilisation, the heat pump and the latent heat storage of chemical salts are all included as special exhibits. Of these one of the thermal storage units is by Aberdare Electric Co., a water heater by Aidas, a refrigerator by English Electric and a sterilising plant by J. W. Woolley and Co. Soil heating demonstrations were shown by Enfield Cables and Rolling Mills Fruit Garden, the equipment being by Electrocult Ltd. This was operated by a Sangamo Weston time switch set to energise it automatically and intermittently, according to the typical 24-hour wind regime.

The E.R.A. are co-operating by showing the latent heat-storage method and the heat pump. Rectifiers are included by E.C.C., and electrolysers by the International Electrolytic Plant Co.

Erection of Machine

The wind generator is not yet completely erected, although most of the components are on site. To illustrate the principle of operation, however, there is on the same site an 8·5-metre power plant, also operating on the depression principle and using a single-wheel turbine driving a 10-kW d.c. shunt wound generator. This was made by the firm of Ateliers et Chantiers de France to the order of Enfield Cables for the Ministry of Fuel and Power.

As far as the 100-kW machine is concerned, the vertical steelwork fabricated by the Redheugh Iron and Steel Co. is being hoisted into position, using special gear. After erection procedure has been tested and fully formulated, the propellers and associated hydraulic variable pitch mechanism will be erected, and the generator and control gear installed. The complete installation weighs just over 40 tons, and the propeller (two blades) weighs 4½ tons. The erection gear is designed to be readily transportable and consists of two 65-ft derricks, two 6-ton hand winches, pulleys and steel ropes.

Solving Vector Problems with a Slide Rule

By R. F. KENCHATT, A.M.I.E.E.

THE following methods of obtaining a vector quantity from its quadrature components, and of resolving a vector into its components, have been taught by the author for a number of years, and will be found capable of producing quick and accurate solutions. They are of particular value to students by virtue of the speed with which the answer is obtained.

A normal slide rule having A.B. scales 1-100 and C.D. scales 1-10 is used. Rules having upper and lower scales folded about π are unsuitable.

The theory is as follows:—

in the triangle shown in fig. 1.

$$\cot\theta = \frac{B}{C}$$

and $1+\cot^2\theta = \operatorname{cosec}^2\theta$

and the hypotenuse $A = C \operatorname{cosec}\theta$

If, therefore, the cotangent of the angle is squared, added to 1, the square root of the resultant number taken and multiplied by the quantity C, the triangle will be solved.

Worked Example

The method of using a slide rule to do this is, perhaps, best illustrated by an example: If two sides of a triangle are 3 and 4 units, determine the hypotenuse.

1. Place the cursor over the larger number on the D scale and bring the smaller number on the C scale coincident with the cursor line, i.e. 4 on the D scale and 3 on the C scale coincident. The cotangent is then given under the 1 on the C scale in the D scale, i.e. 1·334. There is however, no need to read this value since it is the square of the cotangent which is required, and this is given in the A scale over the 1 on the B scale, i.e. 1·777.

2. Add 1 to this number so obtained, i.e. $1+1{\cdot}777=2{\cdot}777$, and move the slide so that the 1 on the B scale is coincident with this value, which is cosecant².

3. The value of the cosecant is given in the D scale under the 1 on the C scale and by moving the cursor to the value of the side previously given in the C scale, i.e., 3, then the value of the hypotenuse (5) is seen to be coincident with it.

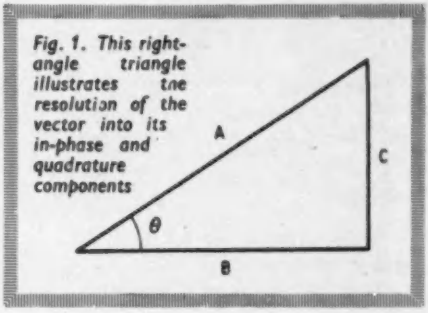


Fig. 1. This right-angle triangle illustrates the resolution of the vector into its in-phase and quadrature components

It is necessary when solving problems to place the larger of the two quantities on the D scale in order that the cotangent value is obtained on the fixed portion of the rule. Note that this method cannot be used if the ratio of the sides is 10:1 or greater, since the cotangent cannot be evaluated. The error in assuming that the hypotenuse is equal to the largest side is, however, in such a case, negligible.

Reversed Procedure

To evaluate one side of a triangle given the hypotenuse and the other side, the procedure is reversed, e.g. find the third side of a triangle given the hypotenuse is 8 and one side is 5.

1. Place the cursor over the value of the hypotenuse in the D scale and bring the value of the side on the C scale coincident, i.e. 8 on the D scale coincident with 5 on the C scale.

2. Read off in the A scale the value indicated by the 1 on the B scale, i.e. 2·56. Subtract 1 from this value, i.e. 1·56.

3. Bring the 1 on the B scale coincident with this figure and read off the value of the unknown side in the D scale under the value of the known side on the C scale, i.e. 6·24.

Should the resultant value after subtracting 1 be a decimal value, say $1{\cdot}64-1=0{\cdot}64$ then the cursor should be set to 64 in the A scale and 100 on the B scale brought coincident with it.

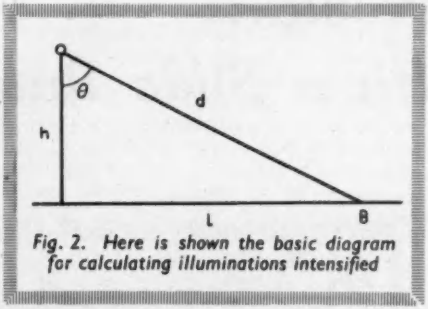


Fig. 2. Here is shown the basic diagram for calculating illuminations intensified

The above method can be used to evaluate the sine of an angle if the cosine be known and vice versa.

$$\text{Since } \sin\theta = \sqrt{1-\cos^2\theta}$$
$$\text{and } \cos\theta = \sqrt{1-\sin^2\theta}$$

As an example, an angle has a cosine of 0·866. What is its sine?

1. Bring 8·66 on the C scale coincident with 10 on the D scale and read the value in the A scale over the 1 in the B scale, i.e. 1·334.

2. Subtract 1, i.e. 0·334, set the cursor to 33·4 on the A scale and bring the 100 on the B scale coincident.

3. Read off the value of the sine on the D scale under 8·66 on the C scale, i.e. 0·5.

Although in the above methods the solution of triangles has been given for clarity it will be seen that any vector problem can be solved in the manner described.

Illumination Problems

An interesting variation of the methods previously given is the determination of illumination values:

The illumination at point B (Fig. 2) is given by

$$\frac{I\cos\theta}{d^2} \text{ lumens/sq. ft.}$$

Where I = luminous intensity in that particular direction in candle power

$$\text{but } \cos\theta = \frac{h}{d} \text{ and } d = \sqrt{h^2+L}$$

$$\text{therefore illumination } E = \frac{Ih}{(h^2+L^2)^{3/2}}$$

and using this expression it is unnecessary to find the angle θ or the distance of the light source d.

The value of d is found and this value cubed, and divided into I × h gives the resultant value of illumination. The following example indicates the operations.

A lamp of luminous intensity 500 c.p. is suspended 15 ft. above a road. Calculate the value of illumination at a point 25 ft. horizontally from the lamp.

here I = 500, h = 15ft., L = 25 ft.

$$E = \frac{500 \times 15}{(15^2+25^2)^{3/2}}$$

1. Place the cursor over the larger of the two numbers in the bracket in the D scale and bring the smaller number on the C scale coincident with it, i.e. 2·5 on the D scale coincident with 1·5 on the C scale.

2. Read the value in the A scale over the 1 on the B scale and add 1 to this number, i.e. 2·775 + 1 = 3·775.

3. Move the sliding scale so that the 1 on the B scale is coincident with this number on the A scale and determine the number on the D scale under the value of the number previously set on the C scale, i.e. 1·5 on the C scale, 2·913 on the D scale. The value of d is, therefore, 29·13 ft.

4. Set the cursor to 2·913 on the D scale and move the slide to bring the 1 on the B scale coincident with the cursor line. Then over 2·913 on the B scale is d^3 in the A scale, i.e. 24·75 or 24,750 ft.^{3}

5. This figure is divided into the luminous intensity 500 c.p. and the height 15 ft. by the use of A and B scales in the usual manner giving a result of 3·02. The position of the decimal point is determined by an approximate calculation and the actual illumination value is found to be 0·302 lumens/sq. ft.

Usually with problems of this nature a considerable number of illumination values at different points have to be determined. The use of the above method of calculation which, with a little practice, can be performed in less than one minute, will result in a big saving in time.

Model Simplifies Transformer Design

THE design of large high-voltage power transformers manufactured by the G.E.C. of America has been simplified by using for initial testing an electromagnetic scale model of the transformer. With this miniature unit transient voltages, voltage magnitudes and waveforms may be determined simply and accurately to effect substantial savings when constructing the large transformer.

Our contemporary journal, *Electrical Engineering* states that on 11 such models, over 200 measurements were made of maximum voltages between corresponding points on the finished transformer and its model. Deviations shown by the latter averaged 4·3% of the applied wave and 9·8% of the voltage appearing on the transformer, showing the models to be sufficiently accurate for design purposes.

Fair Trading Policy Criticised in E.C.A. Discussion

ONE of the pre-requisites of a good conference is good weather. This year the Electrical Contractors Association repeated previous successes in this direction, and added the perhaps more important factors of a good attendance (over 600 delegates and their ladies) and lively discussions.

The conference opened on Monday with a reception in the evening which attracted a large attendance, but real work was reserved for Tuesday. In the morning session on that day the conference was accorded a civic welcome by the Mayor of Bournemouth, Counc. H. P. E. Mears, O.B.E., J.P., listened to the presidential address delivered by Mr. W. T. Trace, and heard and discussed a paper by Mr. J. Mortimer Hawkins.

Fair Trading

The address and the paper were abstracted in our pages last week, and attention here may be focused on the discussion. This was opened from the platform by Mr. R. H. Drake, who characterised the good contractor—the E.C.A. member, in fact—as "the ham in the sandwich" between the consumer and the area board. Mr. Hawkins' idea of grouping contractors in informal local associations he thought attractive, but unfortunately impracticable from the financial aspect. Another of Mr. Hawkins' points, a 24-hour service by co-operation, was more easy of achievement. Not many late-hour calls were likely to be received. He thought there was more support for the Fair Trading policy than the paper suggested.

This last point was taken up by Mr. T. W. Heather (G.E.C.) from the manufacturers' angle. Speaking in a personal capacity, he remarked that his experience was that at any time the dissolution of the Fair Trading Council was mooted, there was immediate disagreement from all sides. Discounts for those not engaged in the industry formed an intractable problem of more than 20 years standing but there had been some progress. Discounts could be justified by work in an industry and by quantity buying. The issue of certificates by the Fair Trading Council was not a practicable scheme, because that organisation should deal with principles only. Any progress on the problem would have to be gradual.

Tragic Failure

Mr. M. E. Broadbent (Huddersfield) thought the failure of the Fair Trading Council tragic. He thought greed on the part of manufacturer, wholesaler and even contractor was at the root of the trouble. He asked for a distributor's discount for the contractor as well as for the wholesaler. Mr. S. H. Evans (Maidenhead) drew attention to the fact that for the purpose of qualifying as recognised users, firms would

The E.C.A. Council is seen in our heading

classify as electrical staff boys engaged on cleaning and blowing out motors. The recognised user, he thought was "a sheer act of lunacy"; this class should be removed from the Fair Trading agreement.

Mr. G. F. Gray (Rushden) told another story in the same field as Mr. Evans—that of a Northampton contractor who had lost seven journeymen electricians to local firms who found it worth while to employ them in order to qualify for discounts. This man had lost the business of these firms as well. Mr. S. L. M. Barlow agreed with the author that arbitration between consumers and area boards was part of the contractor's job, but felt that in the matter of rebates, evolution was wanted rather than revolution. Mr. G. W. Hands (Colchester) was in disagreement. He felt that the Fair Trading agreement was definitely doomed. He called for vigorous efforts against the nationalised industries, and he felt that the trade discount was not large enough.

Mr. Mortimer Hawkins made a full reply to the discussion. In particular he thought tragically inadequate the recommendation made by some speakers of no positive action about discounts and the recognised user. It was an approach which had brought contractors to a position of there being no advantage in going out after large orders.

Tuesday afternoon was taken up by a meeting of the E.C.A. Council, while other members enjoyed the fine weather, and then re-assembled later in the day for a reception held by the Mayor. Wednesday, the last day of the conference, saw the private E.C.A. annual general meeting held during the morning's session.

In the afternoon, Mr. W. H. Smith presented his paper "Electronics and Contracting." We summarised this in our issue last week, but we could not in print do justice to the extensive range of electronic equipment which Mr. Smith had assembled, and which he demonstrated.

Unfortunately, time was short, and there was time only for a few remarks from Dr. Williams after the demonstration was complete. His contribution was to add a warning that if the contractor was to play a part in the equipment industry, he must become more at home with the know-how of high frequency. At the frequencies concerned an entirely new approach to impedance is necessary; resistance was no longer of much importance, capacitance and inductance quite outweighing it.

So the last business of the conference was reached. The Mayor and Corporation were thanked for their help in making it a success, and His Worship made a suitable reply. Mr. Trace, manifesting considerable relief, followed a comprehensive vote of thanks to all other helpers, with the traditional installation of his successor as president. This year he was that well-known figure in the industry Mr. S. L. M. Barlow, and he received a fine ovation from the audience. Vice-chairmen are Messrs. Halliwell, Marryat and Sadler.

As a memento of his year of office, Mr. W. Trace received a gold wrist watch.

(1) Mr. T. Alger is the centre of this Coronation-year Conference group. (2) A happy group of dancers under the "Safe Hands" sign. (3) Mr. W. J. Jones. (4) Mr. and Mrs. V. Dale and (5) Mr. S. L. M. Barlow are received by the President and the Mayor

(1) Mr. W. Trace delivers his presidential address and (2) invests the new president, Mr. S. L. M. Barlow, watched by Mr. Penwill. (3) Mr. Mortimer Hawkins presents his paper

(4) Mr. R. H. M. Drake spoke in the discussion, as did (5) Mr. T. W. Heather. (6) Mr. W. H. Smith demonstrates electronic apparatus in presenting his paper

(7) In a thoughtful mood on the platform are seen Messrs. Barlow, Sadler, Halliwell, Watkins and Trace. (8) Mr. Barlow addresses the conference after his investiture, watched by Mr. S. Watkins (l.) and Mr. M. Sadler (r.). (9) A group of delegates photographed outside the Bournemouth Town Hall after a conference session

Transforming a City Office

MODERNISED INSURANCE OFFICE UTILISES NOVEL LIGHTING FITTING, RETAINS DIGNIFIED APPEARANCE

A FITTING combining both lighting units and ceiling is one of many distinctive features in the recently modernised ground-floor office of a city insurance company. Part of a scheme to modernise the entire office of the Northern Assurance Co., redesigning this ground floor offered initially the general problem of giving it an appearance characteristic of modern architectural thought yet preserving the dignity traditionally associated with insurance offices. The finished work of which some indication is given by the accompanying illustration demonstrates that both demands have been met.

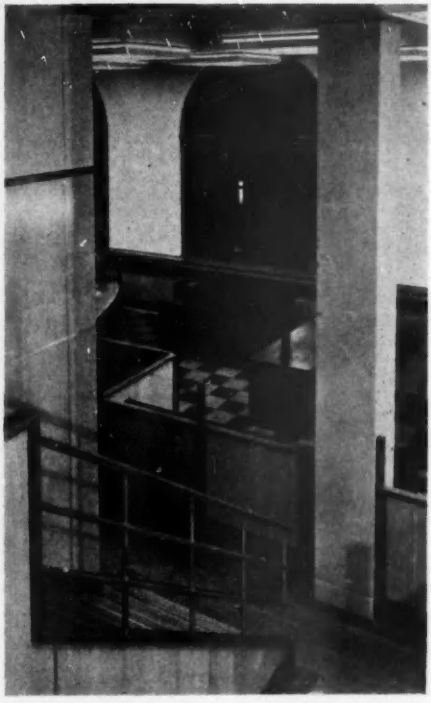
Over and above the general problem of appearance was that of designing an office exterior meeting the structural requirements of the building. The office overlooks two streets, the main entrance being at the corner, windows therefore situated in two walls. Running parallel to the longer of these walls is a line of four square columns down the centre of the floor space. None of these is symmetrical with the windows and, moreover, a fifth column is situated, off-line with the others, at the door end. Two others are also found in the other side of the office. An additional drawback, from the design aspect, was provided by ceiling beams, symmetrical with neither columns nor windows.

Fittings and Ceilings as one unit

Presented with this structural layout, it was decided to design ceiling and lighting fittings as a composite whole, using a second ceiling suspended about 18 inches below the original. For this purpose, it was necessary to level off the original ceiling, and on this surface mount a steel grid from which the fittings could be hung.

The fittings take the form of aluminium frames, 4 ft square, disposed in a regular pattern 4 ft apart on the ceiling and suspended on 18 in. long, $\frac{1}{2}$ in. diameter rods. On each is mounted an aluminium box reflector housing five 4 ft warm white fluorescent tubes. Connections from the end of each lamp are taken to control gear mounted at the side of the frame parallel to the lamps. Three units are mounted on one side, two the other, quick-start gear being used. Slung below the frame is a louvre, shielding the lamps entirely from all but a direct view. Average illumination provided by the lighting at working level is approximately 25 lumens/sq ft, whilst a gap between louvre and frame allows some escape of light to illuminate the ceiling.

Between each frame the area is filled with a false ceiling of perforated aluminium. These



Here can be seen the pleasant yet dignified appearance of the offices as they are viewed from a door adjacent to the main stairway

Left is seen a view of the office down the longer of its two sides. The fittings blend well both structurally and in colour with the furniture and panelling. Below is shown a close-up of the fitting. Its main frame can be seen projecting beyond each side of the louvre, the gap between the two providing adequate space for ceiling lighting

take the form of shallow trays attached to the upper edges of the frames. This construction fills the entire ceiling space, bar a gap of 12 in. approximately round its periphery.

Concealed Wiring

Such a ceiling enabled all wiring to be concealed, in contrast to the surface conduit used previously. Had there been no false ceiling, the structure of the original—of the pot type—precluded any possibility of chasing in conduit without breaking the pot web. Wiring to each fitting is in 3/029 v.r.i. cable in $\frac{3}{4}$ in. conduit attached to the steel grid on the original ceiling.

Areas of ceiling fittings, rather than individual units are controlled by switches in the office. Each switch closes the operating circuit of a contactor which itself closes the lighting circuit for a group of fittings. The number of fittings controlled by each contactor varies from four to five. Protection between contactor and fitting is provided by rewirable fuses, one bridge controlling two fittings. Each contactor is itself protected by a rewirable fuse of suitable rating depending on the number of fittings it controls. All control gear, both switching and fusing, is double-pole on single-phase and neutral at 230 V single-phase.

This control equipment is housed in a concealed box located in the dado on the wall adjoining the main staircase. Wiring from it is taken from it in cable trunking to a ceiling box where the runs in conduit originate.

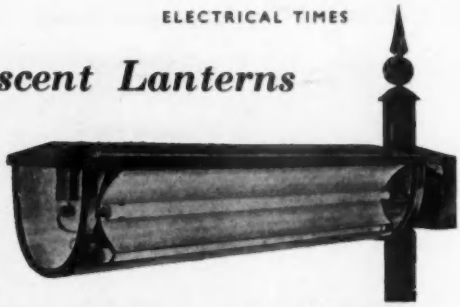
Maintenance of the fittings is straightforward. Access to the lamps is gained through the aperture normally covered by the louvre, this latter being hinged on one side to allow it to be swung downwards. On removing the lamps the reflector may be lifted out to reveal the control gear.

Colour Matching

In their ivory stove-enamel finish, the trays and louvre match well with the deep delft blue of the aluminium and the general lightness in colour of other materials used in the office, of which natural oak, French walnut and silver bronze play a large part. On entering the bronze entrance doors, the visitor is faced with two glass doors opening to a circular gangway surrounding desks arranged radially. This circular layout assists in dissociating the eccentricity of the columns from the central aisle, whilst uniting all structural features into a balanced whole.

Architects responsible for design of the modernisation throughout are Messrs. Troup and Steele, F.R.I.B.A., whilst the fittings were made, to special design, by E. Heffer and Co. Contractors undertaking electrical installation are Trollope and Colls.

Pole Mounting Fluorescent Lanterns



THE introduction of trolley buses into cities and towns has presented a problem to lighting engineers as how to fit fluorescent lighting lanterns to overhead line poles. These poles are specially strengthened and manufactured to withstand heavy duty and constant vibration from the repeated passage of trolley buses, and doubts have been expressed as to the likely reliability of any fluorescent lantern, 6 ft in length and its internally mounted control gear to withstand continuous movement.

Siemens and their associates at Halifax, Alfred Graham and Co., have applied themselves to this problem and have now designed and produced their new "Capital" lanterns which will give satisfactory performance in service when mounted on trolley bus poles. These new lanterns house low-loss control gear in a separate control gear box which is mounted at the rear of the pole. The control gear box has a slip-in access door with a watertight gasket and inspection of the control gear is thereby facilitated. The 4-bolt fixing for the lantern which has proved so successful on Type 5513 has been retained, but in this instance the bolts are fitted through saddles and then passed through to the front portion of the lantern and the cantilever bracket. In effect, the lantern is built round the perimeter of the pole.

The optical section of the lanterns will accommodate two or three 5 ft Sieray fluorescent tubes whose high efficiency and long life are utilised by the scientifically designed reflector system. These reflectors are guaranteed for high efficiency and long life by the introduction of a special polishing and finishing process. The roof of the lantern is of high grade aluminium sheet and the whole is made totally enclosed by a clear Perspex bowl. In view of the servicing difficulties when installed on trolley bus routes, the bowl is fastened by one heavy-duty retaining bolt and has an excellent feature in that the complete bowl slides out to allow for servicing.

I.E.E. AWARDS

IT is announced that the Council of the Institution of Electrical Engineers has awarded the following Premiums for papers read or accepted for publication during the Session 1952-53:

GROUP A. Kelvin Premium to *W. Culshaw*, B.SC., PH.D. John Hopkinson Premium to *D. McDonald*, B.SC.

GROUP B. *Non-Section Premiums:* Llewellyn B. Atkinson Premium to *O. J. Crompton*, M.ENG. and *G. A. Wallace*, B.SC.(ENG.). Extra Premium to *C. G. Clayton*.

Measurements Section Premiums: Silvanus Thompson Premium to *P. S. T. Buckerfield*. Mather Premium to *L. Hartshorn*, D.SC., *J. V. L. Parry*, M.SC. and *E. Rushton*, B.SC.(ENG.). Extra Premiums to *C. Ryder*, *J Rushton* and *F. M. Pearce*, B.SC.(ENG.); to *K. F. Sander*, M.A., PH.D. and *J. G. Yates*, M.A.; to *R. V. Moore*, G.C., B.SC.; to *R. H. Dunn*, B.SC. and *C. H. Chambers*.

Radio Section Premiums: Duddell Premium to *D. C. Birkinshaw*, M.B.E., M.A. Ambrose Fleming Premium to *D. A. Wright*, M.SC. Extra Premiums to *H. Cafferata*, *C. Gillam* and *J. F. Ramsay*, M.A.; to *E. McP. Leyton*, *E. A. Nind*, B.SC.(ENG.) and *W. S. Percival*, B.SC.(ENG.); to *Prof. F. C. Williams*, O.B.E., D.SC., D.PHIL., F.R.S. and *G. B. B. Chaplin*, M.SC.; to *G. R. M. Garratt*, M.A. and *A. H. Mumford*, O.B.E., B.SC.(ENG.); to *B. G. Pressey*, PH.D., M.SC.(ENG.), *G. E. Ashwell*, B.SC. and *C. S. Fowler*, *P. A. T. Bevan*, B.SC., *W. R. Piggott*, B.SC., *H. E. Holman* and *W. P. Lucas*, *E. C. Cherry*, D.SC. and *G. G. Gouriet*, *A. J. Biggs*, PH.D., B.SC. and *E. O. Holland*, *L. C. Jesty*, B.SC., *Prof. H. E. M. Barlow*, PH.D., B.SC. (ENG.), *A. L. Cullen*, PH.D., B.SC. (ENG.) and *A. E. Karbowiak*.

Supply Section Premiums: Sebastian de Ferranti Premium to *A. F. B. Young*, B.SC. John Snell Premium to *L. G. Brazier*, PH.D., B.SC., *D. T. Hollingsworth* and *A. L. Williams*, PH.D., M.SC. Extra Premium to *M. W. Humphrey Davies*, M.SC. and *G. R. Slemon*, PH.D., M.A.SC.

Utilisation Section Premiums: Crompton Premium to *B. L. Metcalf*, B.SC.(ENG.) and *G. Cuttle*, T.D. Swan Premium to *B. C. Robinson*, M.SC., PH.D. Extra Premium to *Prof. Y. H. Ku*, SC.D.

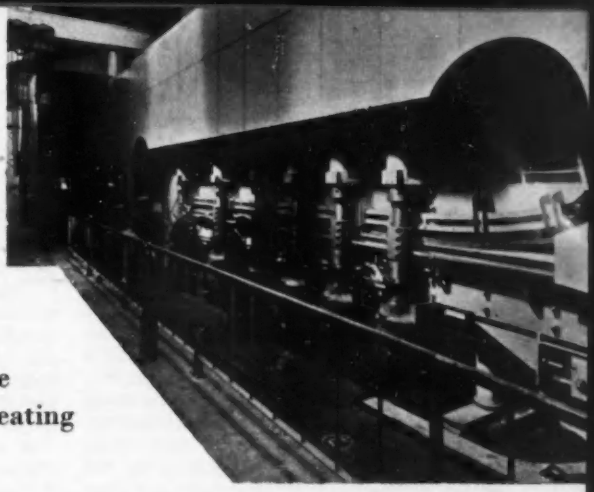
GROUP C. Frank Gill Premium to *L. B. S. Golds* and *P. Schiller*, DIPL.ING. Heaviside Premium to *R. H. Barker*, B.SC. Paris Exhibition (1881) Premium to *C. A. Cameron Brown*, B.SC. and *P. G. Finn-Kelcey*. Webber Premium to *G. W. A. Dummer*, M.B.E. and *D. L. Johnston*, B.SC.(ENG.).

Students' Premiums to *B. Z de Ferranti*, B.SC., B.E., *J. B. Gopsill*, B.SC., *J. A. S. Hilditch*, B.SC., *L. L. Alston*, B.SC.(ENG.), *J. C. Arkless*, B.SC., *D. G. Berry*, B.SC., *D. W. Birnstingl*, B.SC.(ENG.), *J. H. Davis*, *J. P. Harbord*, B.SC. and *J. M. Raven*.

2 JULY, 1953

Reclaiming Wood Waste

Board Synthesising Machine Uses 90 kW of Dielectric Heating



IT is not generally appreciated how high is the proportion of waste in the process of converting raw timber to finished wood products. Reliable figures indicate that this is about 60%, and apart from the loss of this material, in its normal form such as small branches, shavings and so on, it presents a most difficult disposal problem.

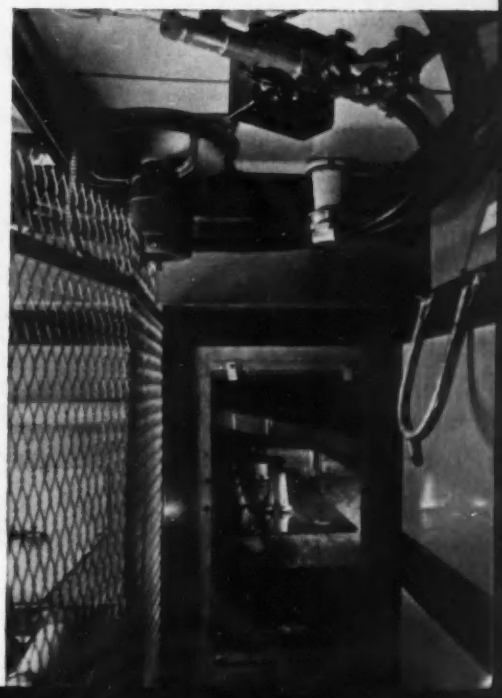
Much work has been done in the past to utilise this waste in the manufacture of board, using some form of binder and curing the combination of wood chips and binder in presses with heated platens. Unfortunately, this form of processing involves separate loading into the press for each board, with consequent expensive hand labour and further the press itself has a large proportion of standing or idle time in the production cycle.

As long ago as 1939, the original B.A.R. (British Artificial Resin) Company began research into a continuous production of building board from bonded wood flakes and chips. By 1943 the first designs for a pilot plant had been completed and in 1947 this went into operation making boards 18 in. wide. Intensive work based on this pilot machine resulted in the production of the first large scale commercial unit in the world which is now running at Marks Tey, near Colchester. When the plant is fully employed it will have an annual output of 16,000 tons representing between 25 and 40 million square feet of board, depending on the thickness.

Operating Principle

The first stage is to reduce the raw material to uniform and correct particle size and to control the humidity. This latter factor is of great importance as the compressibility of the wood is a function of the moisture content, which in turn varies according to the type of wood and conditions of storage before it enters the factory. Drying units are therefore incorporated in the raw materials preparation plant. After grinding, the wood is pneumatically transported to a vibratory screen system which sorts out the undersized particles and after drying is stored in a special bin with a controlled discharger.

The wood is then mixed with resins and fed in a uniform thickness on to a stainless steel belt. This belt carries the material forward into the high frequency heating unit which consists of three h.f. heaters with a total r.f. output of 90 kW at 18 Mc/s. The effect of these heaters is to preheat the wood resin



The heading block shows the pressing section of the Bartrev machine. On the right is the interior of one of the h.f. cubicles. The board can be seen through the inspection window

mixture to a temperature of 85 to 95° C.

From the heating station the material moves into the press proper. A second endless polished stainless steel band comes down on to the upper surface of the wood resin mixture, and two endless heated platen chains compress the material through the bands. The patented features of this part of the process include the design of the platens and chains so that the steel bands are not damaged, and the pressure distributed evenly. The compacting process consists of two stages, the first being the expulsion of air from the voids and the rearrangement of particles to fill these voids, the second is the actual compression of the particles themselves. Of these stages the latter requires considerable pressure, but after it has been completed and curing started relatively little pressure is required for holding the board at its correct thickness and to prevent recovery.

The final heating stage which has to be effected in the press by heat transfer from the radiant-heated platens raises the temperature of the raw material to a total of 110°-115° C.

The dimensions of the whole machine are: length 134 ft, width 7 ft 6 in., height 20 ft and weight 200 tons. Drive is provided by a 35 h.p. 3-ph induction motor operating through an infinitely variable speed gear box and the speed of the stainless steel belts can be varied between speeds of 4 and 30 ft per minute. The width of the product is up to 4 ft and thickness can be varied between $\frac{1}{8}$ and $\frac{3}{4}$ in. Arrangements have also been made on the machine for feeding in special surfaces and finishing materials.

ULTRASONICS DETECT RAIL FLAWS

USUAL detection of flaws in rail have the disadvantage that only when cracks have grown to a considerable size may they be easily detected, provided they are not concealed by collections of dirt. Detection of cracks at rail ends is particularly difficult and of incipient cracks largely impossible. Recently, however, equipment has been developed in which an ultrasonic beam is employed to detect such flaws, the London Transport Executive being one of its first users in this country.

Manufactured by Branson Instruments Inc., the equipment is known as the "Audigage" flaw detector. It consists of a battery-operated ultrasonic frequency generator and receiver, carried in an 11½ lb. pack on the operator's back together with a crystal transmitter head on the end of a handle and headphones. Powered by three 1·5 V and two 67·5 V batteries, the main equipment contains three valves of the miniature type, tone and volume controls, together with a milliammeter for battery testing.

Here the equipment is seen in use on the Metropolitan Line at Neasden

As the main on-off switch is a mercury contact in the crystal housing, it cannot be operated until the head is in the vertical position. To use the equipment, therefore, the crystal must be placed on the rail head, after having plugged in crystal and headphones leads so that the length of the crystal lies transversely across the rail. A thin film of oil on the rail head is necessary to ensure good contact.

As the crystal head is moved along the rail, a continuous note is heard in the head phones, set up by reflection of the ultrasonic vibrations from the lower edge of the rail. On passing a crack in the metal the pitch of the note drops, the nearer the flaw to the rail surface the greater the fall in frequency. The note ceases altogether should the crack be substantially parallel to the crystal head and hence no indication of the depth of the flaw is obtained in this case. Bolt holes at each end of the rail effect a similar reduction in pitch, but as these give a characteristic and quickly recognised note their presence does not tend to affect the performance of the apparatus. Small cracks beneath the bolt holes, however, cannot be detected, their presence being masked by the hole.

PROBLEMS AND PRACTICE in Engineering

Motor Breakdowns

REFERRING to "Problems and Practice" page of June 11, your correspondent J. A. W. in his article entitled "Motor Breakdowns" states that "the breaking of the field with the armature stationary caused a high induced e.m.f. in the armature windings and that this high induced e.m.f. caused the armature insulation to break down."

As a somewhat similar principle is widely used for determining the neutral position of the brushes on d.c. motors and generators, I am at a loss to understand how a high induced e.m.f. was produced in the armature windings to cause breakdown in the insulation of those windings. If any insulation was to break down I would have said it would be that of the field windings due to the high self-induced e.m.f.

From the information given I would suggest that the reason for the breaking down of the armature insulation lies elsewhere. For instance, heavy sparking was stated to have taken place round the commutator (this would not have been caused by any high induced e.m.f.) which suggests that the motor may have been considerably overloaded at times, thereby causing overheating of the armature conductors with consequent deterioration of their insulation. This deterioration would be cumulative until a point was reached where the working voltage of the motor broke down this insulation.—*E. A. R.*

The above was forwarded to "J.A.W," his reply being given below.

YOUR correspondent refers to my statement "that the breaking of the field with the armature stationary caused the breakdown of the insulation in the armature" as not being, in his opinion, the real cause of the trouble and states that there is a similar principle in use for determining the neutral position of the brushes on d.c. motors. I presume he refers to what is known in our workshops as the "back kick" test. This test, of course, makes use of a low voltage supply to energise the field, roughly about 12 volts whereas the voltage in the case of the 50 h.p. motor was that of the incoming mains supply, namely 460 volts, with corresponding increase in induced e.m.f.

I quite agree with him that one usually connects the breaking of a field, without discharge protection, as the cause of the breakdown of the insulation in field coils, solenoids and such like, but in the case of this special instance it was also the armature that suffered. The suggestion is made that perhaps the motor had been subjected to heavy overloading at some time and causing overheating and consequent deterioration of the armature insulation. In this case when the armature was stripped the slot insulation was as fresh as when put in with the exception of the punctured parts. It is because of this puncturing that I am still convinced that the cause of this breakdown was due to the breaking of the field with the armature stationary.—*J. A. W.*

Immersion Heater Design

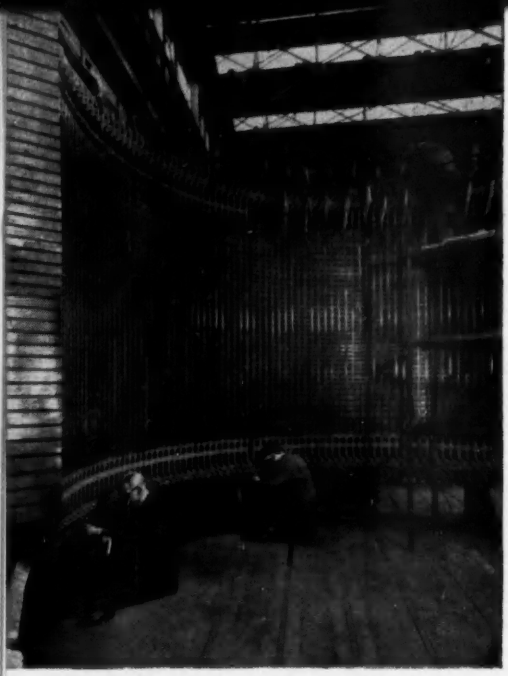
CURIOUSLY enough, following my recent notes on the elusive earth caused by an immersion heater circuit (ELECTRICAL TIMES, April 23), and the consequent correspondence arising thereon, another case of immersion heater fault was brought to my attention.

An immersion heater of side entry type, with the thermostat and connection block housed on the same flange and with the same cover, was fitted and connected up in the hot water cylinder. The thermostat was set for 150° F.

A few weeks later, however, complaint of heater failure was received and inspection was made which showed that the elements had burned out. It was also noted that the thermostat was set to a higher temperature and that the thermostat terminal housing the mains positive lead was now resting against the thermostat connected terminal of the immersion heater element, thus effectively by-passing the protective thermostat device.

It was explained by the customer that to obtain a higher water temperature the thermostat setting had been altered. The large increase in temperature due to the constant running heater was taken for granted by the client as the consequence of altering the thermostat.

Now from this case various errors are apparent, one being that no shrouds were provided for the thermostat's terminals (and these were not provided by the electrician either), others being the inclusion of the thermostat within the terminal cover necessitating removal, and the unsuspecting damage by the consumer by virtue of these conditions.—*J. R.*



EXPORT EMPHASIS

Overseas Engineers visit English Electric Stafford and Preston Works

A TWO-DAY trip was arranged last week for overseas guests, distinguished engineers and government officials to visit the Stafford and Preston factories of the English Electric Co.

On arrival at Stafford on the first day, the party was received by Sir George Nelson, who in a short speech explained the general policy of the company with regard to employer-employee relations, stressing the vital importance of maintaining the atmosphere of a 'family' concern even though the company was a public company. He also emphasised the great degree of autonomy which had been given to the various works which comprised the English Electric Company.

Alternators

At Stafford, apart from the large and well-equipped blocks of the Nelson Research Laboratory, the main production consists of transformers, large rotating electrical machines, switchgear and meters. Many of these were seen in various stages of construction, probably the most impressive sight being the vertical water-turbine-driven alternator for the Kemano scheme of the Aluminium Company of Canada. Rated at 122 MVA, this machine must be among the largest to be built in this country. Also impressive in size were the large mill motors, one of double armature design rated at 4,000 b.h.p., 35/90 r.p.m., for Longwy, France, and the other, an a.c. reversing motor of 5,840 h.p., 52/120 r.p.m., for Sandviken, Sweden. Each of these motors is to be capable of accepting peak loads of three times normal.

Hydrogen-cooled sets were also well represented. Two for the B.E.A. were a 76 MVA 3,000 r.p.m. set for Stourport, and a 75 MVA 3,000 unit for Drakelow. Overseas orders included a 70·6 MVA 3,600 machine for the Hydro-Electric Power Commission of Ontario.

Apart from the Kemano hydro-electric plant, other overseas hydro power orders in course of manufacture were for Cabril (61 MVA), Salime (30·4 kVA), Barrios de Luna (16 MVA), and Snowy Mountain (33·3 MVA).

These, of course, only represent a part of the orders in hand both for steam and electrical plant.

Transformers and Switchgear

Transformers were present in great variety and of these attention was particularly drawn by a 100 MVA regulating transformer for Tasmania, a 64 MVA 225/112·5/10 kV unit for Finland, and an 80 MVA 230/115 kV transformer for California.

Regenerative braking and loading cubicles for the South African Railways next attracted attention, while in the Switchgear Department were numerous air-blast and oil-circuit-breakers in process of manufacture.

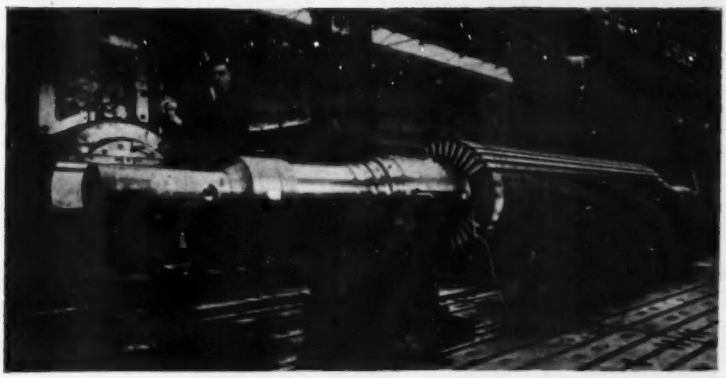
Sealed steel tank mercury-arc rectifiers for industrial and traction use were being manufactured in quantity both for home and overseas use.

The following day the guests visited the Preston Works, where they were able to see something of the company's traction and aeronautical activities. Among the former were included locomotives and equipment for the Netherlands, Spain, British Railways, Queensland and Victoria. Of these locomotives, the majority were diesel-electric; but 63 electric

locomotives are being delivered to Spanish National Railways. With a rated output of 3,600 h.p. at 3,000 volts d.c., these are among the most powerful of their type yet built in Britain. Initially they will operate on the 38 mile Ujo-Busdongo section of the Oviedo-Leon route, which carries a heavy mineral traffic, but they will also be used for passenger haulage.

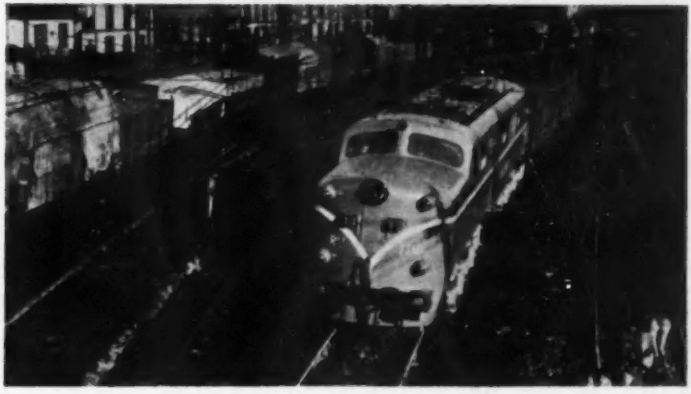
The trip ended with a visit to Samlesbury airfield where a magnificent display of flying was put up by one of English Electric's Canberra aircraft.

Two exports which are under construction by the firm are a 122 MVA water-turbine alternator for Kemano, Canada and a large rolling mill motor for Sweden. On the opposite page workmen are seen winding a section of the stator for the Canadian order, and on the right a young apprentice aids comparison of the size of the armature destined for ultimate shipment to Sweden



The visitors were impressed by such operation as the machining of this rotor for a 75 MVA 3,000 r.p.m. turbo-alternator. This is for one of the B.E.A. power stations

Visiting the Preston Works the overseas guests saw evidence of the company's work in the traction field. Typical of this work is one of sixty-three 3,600 h.p. 3,000 V d.c. locomotives for Spain seen here hauling a freight train on the Spanish National Railways system



overseas news

A Plea from Winnipeg

The shortsighted policy of taking much of the profits of the Winnipeg City hydro-electric system for the relief of the city's rates, is criticised by Mr. H. L. Briggs, the general manager, in the report of operations of the undertakings for 1952. In recent years this milching of the undertaking has reached serious proportions—over $5 million has been contributed to the city budget in the past five years. Mr. Briggs' criticism is based on the fact that the undertaking's existing power plant is nearing the end of its useful life, and replacements will be costly. The position has also been accentuated by the city voters deciding that the City Hydro power plants should not be handed over to the Manitoba Hydro-Electric Board. Yet that matter apart, the undertaking had a reasonably successful year, although the number of units sold, at 764·7 million was only an increase of 3·2%—one expects more noteworthy rises in Canada. For water heating alone (apart from off-peak electric boilers), the total consumption was 223·1 million units, at an average price of 0·357 cents compared with the average domestic price of 0·749 cents p.u. The average consumption per home again rose to 6,891 units p.a. The year's operations resulted in a surplus of $916,219, of which $800,000 goes towards the city's budget. At the Amy Street steam power station, work continued on the concrete foundations for the final 25,000 kW generator, which together with the associated boiler is scheduled for initial operation before the end of this year.

Quebec's Scheme

The 100,000 h.p. hydro-electric development on the Manicouagan River is to be inaugurated by Mr. Duplessis, Premier of Quebec, on July 18. Constructed for the Manicouagan Power Co., part of the output from this station will be fed by underwater cables across the St. Lawrence River to Gaspe's copper mining development for about a year, until the nearby Bersimis river project is completed. It has also been announced that a hydro-electric power establishment will probably be built at Eaton Canyon, in Ungava, to serve the needs of the iron ore mining area on the Quebec-Labrador boundary.

Financial Aid

The Saskatchewan Government has offered to provide $20 million towards the cost of constructing the main dam in the proposed South Saskatchewan River project. This is the province's second step in seeking Federal approval of the scheme over which there has been much discussion, firstly because of a wide variation in the estimate of the cost of the whole scheme, and secondly, on the question of possible restriction of water supplies in some areas. On the basis of the province's estimate of the total cost of the scheme, $130 million, the present offer would bring the province's share of the overall costs to 50%, including the costs of the power and irrigation installations. In making the offer, Premier Douglas said he was anxious to remove any suggestion that there might be a federal subsidy for the production of power.

Return to Austria

The Ybbs-Persenbeug hydro-electric plant, which is being returned to the Austrian authorities by the Soviet administration, is to be completed within five years at a cost of 1,500 million schillings, it is reported. Electricity generated at the plant will be used to supply Vienna and Lower Austria and will not be exported. It is pointed out that the areas to be served by the new plant are the most highly industrialised in Austria. As they normally depend on thermal power stations during the summer, the supply of about 1,000 million kWh from the Danube station will result in considerable fuel economy.

The Lamp Market

Presiding over the annual general meeting of the Indian Lamp Factories Association held recently in Calcutta, Prof. S. K. Roy indicated how the uniform cut of 25% in the production of G.L.S. lamps introduced for all the factories with a capacity of more than one million lamps per year, helped the industry to tide over the crisis of over-production. It was stated that the cut, which was due to be reviewed next month, should be continued for a further period of six months. It was, however, pointed out that the full benefit of such restrictions would not be utilised by the indigenous industry due to the apprehension that the import of other lamps at the record figure of 1,495,115 pieces during January-December, 1952, tended to divert the demand to other lamps from the G.L.S. type lamps. It was suggested that the import restrictions on other lamps should be tightened up. The Planning Commission had estimated the demand for electric lamps in India at about 30 million pieces annually by 1955-56, but Prof. Roy pointed out that local production for that year has been assessed at 32.5 million lamps—therefore a rational policy of restrictive production was needed. He also suggested the formation of a joint concern for the production of raw materials and components.

Expansion in Dacca

To provide funds for an extensive reinforcement of the distribution system in Dacca, capital of East Bengal, the Dacca Electricity Development Co., Ltd. (a Government sponsored concern) has issued shares amounting to Rs. 100 lakhs. A long-term expansion programme for the system has already been drawn up by Messrs. Merz, Rendel, Vatten (Pakistan), consulting engineers for the Dacca Electric Supply Co., which is to be taken over by the Development Co. at a date yet to be announced. This provides for the expenditure of nearly Rs. 50 lakhs on cables, switchgear, transformers, etc. In recent years the demand for electricity in Dacca has increased at a tremendous pace—units sold in 1951 by the Dacca Electric Supply Co. amounted to 9·3 million, but at the present rate of growth that figure will reach 20 million by 1955, it is estimated. To meet the load the East Bengal Government has in hand the erection of another power station which is being interconnected with the existing plant. In addition, a further boiler is on order for Dacca power station to enable the maximum output to be obtained.

Darkened Outlook

Victoria is likely to have power cuts again after 1956 because the State Electricity Commission has no hope of installing reserve plant to meet future requirements. This forecast on the State's power position was recently made by Mr. R. A. Hunt, chairman of the Commission, who explained that it was all due to the restrictions forced on the Commission because of lack of funds. Expenditure planned on capital works had been cut from an average of £42 million to £31,850,000 this year, with a probable further cut likely next year. If the present financial position continued, the curtailed construction programme would fall far short of the normal increase in use of electricity. The Commission should now be ordering generating plant to come into service in 1958 and later. But this could not be done without an assurance of finance. To do it without that assurance would only be courting a repetition of the commission's recent "disastrous experience." Referring to the supply to new consumers in the immediate future, Mr. Hunt said that the position was satisfactory. During the next two years a total of 200 megawatts of additional capacity would be added to the generating system.

Mica Trouble

There are reports of the closing of several of the mica mines at Harts Range, in Central Australia—Australia's only mica field, which has been the source of much of the requirements of the local electrical appliance manufacturing industry. According to the reports, the mines have been closed because the Government mica pool has ceased to purchase certain sizes of the product.

Rural Subsidy Increased

An increase in the New South Wales State Government's subsidy limit for rural electricity extensions was announced by Mr. J. B. Renshaw, Minister for Local Government, when opening the annual conference of the Shires Association of N.S.W. last month. On work commenced since May 1, the subsidy is £260 for that month, and it will rise by £20 each month until it reaches £400 on December 1 next. Up to the present time the subsidy limit has been £250. Mr. Renshaw added that the conditions of subsidy will be substantially the same as those applying at present, except that in future the only extensions to be subsidised will be those to serve farms and premises in rural areas, whose occupants form part of the rural community either by engaging in primary production or in ancillary services. The new limit has been introduced as a result of the large increase in the cost of constructing rural lines since the rural electricity subsidy scheme was introduced in 1946.

Loans Wanted

The Japan Electric Power Development Co. has applied to the World Bank at Washington for a $300 million credit, we learn. Along with its application, the company has sent a detailed plan of the development of power resources in Japan. The president of the company, Tatsunosuke Takasaki, has also revealed that negotiations are in progress with certain American private banks for the borrowing of over $7 million for the construction of the Sakuma power plant on the Tenryu River in Shizuoka Prefecture, for which the assistance of the Atkinson Co. of the U.S.A. is likely to be sought, we gather. There are also three thermal projects particularly in mind, one for a 66 MW plant for the Chubu Electric Power Co., another for a 75 W Munit for the Kyushu Electric Power Co., and a third for two 75 MW sets for the Kansai Electric Power Co.

Railway Electrification

The Japanese National Railways are to extend the electrified section of the Tokaido trunk line from Hamamatsu to as far west as Nagoya later this year, it has been announced by President Sanosuke Nagasaki of the Railways Corporation.

Power from the Yangtse?

A general survey of the main tributaries of the Yangtse River has just been completed, we learn. In the Szechuan province sites have been determined for 17 reservoirs preparatory to the hydro-electric development of the river. These reservoirs would hold some 50,000 million cubic metres of water, giving a generating potential of 36 million units. This would be sufficient for the whole of the upper Yangtse river basin, spreading over eight provinces of south-west and central China. At the moment the plan is that the mineral resources of the area would then be developed. But it is first proposed that a more detailed survey of the river should be undertaken.

PERSONALITIES

IN THE INDUSTRY

Chosen for the post of assistant general manager to the Trinidad and Tobago Electricity Commission is **Mr. W. M. Cotsworth,** A.M.I.E.E., A.M.C.T., who is at present with Merz and McLellan at their Esher offices. Mr. Cotsworth was educated at Arnold School, Blackpool, and the Faculty of Technology, Manchester University, and received training and early experience with Manchester Corporation Electricity Department. On the outbreak of war he was seconded to the Department of Scientific Research, Admiralty, and served with the R.N. Scientific Service. He joined I.C.I. Ltd., at Wilton Works, Middlesbrough, in 1937 as electrical construction engineer, but left in 1950 to take up the position of senior assistant engineer, generation construction department, at B.E.A. Headquarters, the post he relinquished to join Merz and McLellan.

Mr. W. M. Cotsworth

On June 30 last, **Mr. Hugh McC. Jack,** B.Sc., reliquished his executive duties as chief electrical engineer of the British Thomson-Houston Co., but he retains his directorship. He is succeeded by his former chief assistant, **Mr. G. S. C. Lucas,** O.B.E., M.I.E.E. Mr. Jack has been closely associated with the design of electric machines for virtually the whole of his professional life, specialising in a.c. plant of advanced design. Apart from a spell in Germany in 1910/11, he has been identified with B.T.H. since 1908. He was manager of the A.C. Engineering Dept. from 1922 to 1945, when he became chief electrical engineer. His successor, Mr. Lucas, joined B.T.H. in 1915, and after further studies at the City and Guilds Engineering College, he became an assistant to the head of the B.T.H. Research Laboratory, specialising in electronic research. In 1932 he was appointed head of the Electrical and Development Section of the Research Laboratory, which during the war was engrossed in secret developments of radar applications, leading to the production of the first centimetric fire control equipment used by the British Army. In recognition of his contribution to this development, he received the O.B.E. in 1944. When the Electronics Engineering Department was formed in 1945 to handle the rapidly expanding business arising from wartime developments, he became its manager, but shortly afterwards was promoted to assistant chief electrical engineer.

Mr. Hugh McC. Jack

Mr. G. S. C. Lucas

Previously sales engineer with Benjamin Electric, Ltd., **Mr. R. J. Cotton** has joined the London staff of Pyrotenax Ltd. as technical representative in that area.

Station superintendent at Wimbledon generating station, London Division, B.E.A. since 1926, **Mr. E. W. Greenway,** retires from that position on August 7. During his period at Wimbledon the undertaking built up a handsome domestic load under their progressive chief engineers —its tariffs were among the lowest in the country. Before going to Wimbledon in 1918 as charge engineer, he held a similar post for four years with the Twickenham and Teddington Electric Supply Co., and he had also served at Stepney, Torquay and Bradford. At Stepney at that time were Parsons turbines direct coupled to two d.c. generators, i.e., giving a.c. and d.c. from each generator, a very unusual arrangement. Also, during his spell at Twickenham, the power station had two machines generating h.t. d.c. at 2,500V.

Mr. E. W. Greenway

After 35 years service with the Derby electricity undertaking, **Mr. J. Pullein,** A.M.I.E.E., deputy station superintendent at Derby power station, was recently presented with a pair of binoculars on his retirement. The presentation was made by **Mr. W. Warren,** M.I.Mech.E., M.I.E.E., M.Inst.F., generation engineer (operation) for the Northern group, East Midlands Division, B.E.A. Mr. Pullein started his career at Leeds. Later he held positions with the Scottish Central Electric Power Co., Falkirk and Rawtenstall Corporations before going to Derby in June 1918 as a charge engineer. In 1937 he became boiler house engineer, and in 1948 deputy station superintendent.

Promoted to sub-area commercial officer, No. 4/5 sub-area of the Merseyside and North Wales Electricity Board, is **Mr. O. L. Ritchie,** A.M.I.E.E., Assoc.I.H.V.E., who was previously the assistant commercial officer there. He succeeds **Mr. T. R. Smith,** A.M.I.E.E. who has transferred to the Board's headquarters, as we noted in May 14. Mr. Ritchie received his technical training at Liverpool Central Technical College and practical training with the Birkenhead Corporation Electricity Department. In 1937, he went to the Hull Corporation Electricity Department, afterwards serving as sales engineer/consumers' engineer in No. 6 sub-area of the Yorkshire Electricity Board, before joining the Merseyside and North Wales Board in 1949.

Mr. O. L. Ritchie

Mr. O. E. Trivett, A.M.I.E.E., M.Brit.I.R.E., has been appointed a director of Aerialite Ltd., which company he joined in 1950.

Formerly sales and service engineer with Fraser and Borthwick Ltd., **Mr. J. Jenkins** has now joined the staff of The Belmos Co. Ltd. He will be concerned with flameproof and industrial control gear sales in the Scottish area.

Two new directors were appointed at a board meeting of the General Electric Co., Ltd., last Thursday. They are **Mr. O. W. Humphreys,** B.Sc., M.I.E.E., F.Inst.P., director of the G.E.C. Laboratories, and **Mr. A. L. G. Lindley,** M.I.Mech.E. general manager of the Fraser and Chalmers Engineering Works of the G.E.C. It was just over a year ago that Mr. Humphreys became director of the Research Laboratories, after two years as manager of the laboratories in succession to the late Sir Clifford Paterson. Mr. Lindley also, has held his present position for just over a year, succeeding Mr. F. Lonsdale. He started with Fraser and Chalmers in 1918, but after later experience in the mining department was appointed chief engineer for the British General Electric Co., Ltd. in South Africa in 1933.

Mr. O. W. Humphreys

Mr. A. L. G. Lindley

Senior demonstrator at the North Western Electricity Board's No. 3 sub-area, at Oldham, **Miss E. Joan Sharp** has been awarded the 9th Travelling Exhibition by the Caroline Haslett Trust. In 1950 Miss Sharp won the Elizabeth Sloan Chesser Cup which is awarded to the demonstrator who gains the highest marks in the tests for the E.A.W. Diploma in Electrical Housecraft. She is to visit Western Germany chiefly to study many aspects of electricity in the domestic sphere. She has had wide experience in demonstrating, and is an examiner for the E.A.W. Home Workers' Certificate.

Miss Joan Sharp

Appointed as manager of the Bristol district of the Hotpoint Electric Appliance Co. is **Mr. A. R. Cowtan,** who will be responsible for the sales of the company's products in the south-west of England. Mr. Cowtan was formerly sales representative for Devon and Cornwall, which position is being taken over by **Mr. Alan Smith,** who was previously with the South Western Electricity Board at Penzance.

Mr. A R. Cowtan

Assistant secretary of the North Eastern Centre of the I.E.E. for the past 14 years, **Mr. J. McGeary,** comp. I.E.E., has resigned from that post. As a token of the centre's appreciation of his valuable work, it is proposed to make a presentation to him at the end of this session. Contributions for this should be sent either to Mr. H. Leyburn, chairman of the centre, or to Mr. A. T. Crawford, the hon. secretary.

Setting up a record, **Mr. Wilfred Clarke** has won the oldest shooting trophy in Gt. Britain—the Siller Gun—for the third time. Mr. Clarke is chief assistant mains engineer at Kirkcudbright, South West Scotland Electricity Board, and was, earlier, district engineer to the Stewartry County Council, and for 14 years with the Boston Electricity Co. He is shortly leaving Kirkcudbright, we understand, to become district commercial engineer, at Annan, Dumfriesshire. The Siller Gun trophy is a miniature silver gun of the type used some 400 years ago and was presented by King James VI of Scotland to be shot for on special occasions. Mr. Clarke has just won the trophy during the Coronation celebrations at Kirkcudbright. He previously won it on the occasion of the Queen's marriage and then at the birth of Princess Anne.

We find it hard to believe that the end of next month will bring the retirement of another of our very good friends—**Mr. Alan N. East,** C.B.E., M.I.E.E., M.I.Mech.E., Assoc.Inst.C.E., who has been chief engineering inspector, Electricity Division of the Ministry of Fuel and Power, since 1948. He is always so cheerful and successful in carrying his years comparatively lightly. But turning to our files we find that he has been associated with the Supply Industry since February 1919—and he himself says that his departure will be quite a wrench. That we can well believe, but we sincerely trust that it does not mean we shall not be enjoying his company so frequently. Most of his experience, of course, was gained with the Electricity Commissioners, whom he joined in 1920, after some months as chief assistant in the old Board of Trade Electric Power Supply Dept. On behalf of the Commissioners, he conducted numerous inquiries up and down the country, in which capacity he made a wealth of friends, who will join us in wishing him a long and happy retirement. He was awarded the C.B.E. in 1951.

Mr. Alan N. East

Mr. James Nelson, F.S.A.(Scot.) F.R.P.S., M.I.E.E., Hon.M.Brit.I.R.E., relinquished his post with British Insulated Callender's Cables Ltd., on June 30.

Mr. H. McWhinnie, J.P., retired from the position of general sales manager of the Steel, Peach and Tozer branch of the United Steel Companies Ltd., but he remains with the company for a period to advise on sales development. The position of general sales manager of that branch has been discontinued and all departments responsible to the commercial director will be co-ordinated through the assistant commercial manager **Mr. J. MacKenzie-Mair.**

Appointed as purchasing officer to the North Western Electricity Board is **Mr. Frank Linley,** A.M.I.E.E., A.M.C.T., now mains engineer to the board's No. 1 sub-area. He succeeds **Mr. J. Mills,** who, as we have already noted, is now manager of the board's No. 7 sub-area (Stockport). He started in the industry with Manchester Electricity Department, holding various positions before being appointed chief assistant mains engineer in 1944. On nationalisation he became sub-area mains engineer for the board's No. 1 sub-area.

Mr. F. Linley

Another who retired at the end of June is **Mr. Hugh E. Easton,** chief accountant to Johnson and Phillips Ltd. Now 75 years old—well over normal retiring age—his vitality is amazing and he is still loath to leave business behind him. In recognition of his nearly 60 years' service with the company a dinner was held in Mr. Easton's honour at the Devonshire Club, St. James's, recently. Here he was presented with a radiogram by the chairman, **Mr. G. Leslie Wates,** J.P., on behalf of the company, and with a clock and cheque by **Mr. W. F. Smith,** works accountant, from Mr. Easton's colleagues.

Mr. H. E. Easton

An assistant commercial manager of the British Electricity Authority for the past five years, **Mr. F. S. Naylor,** B.Sc.(Eng.), M.I.E.E., has been appointed specifications and contracts engineer in the chief engineer's department of the Authority. Between 1940 and 1948, he was successively borough electrical engineer and manager at Southwark, Gravesend and Islington. Earlier he had been chief electrical engineer to Firth-Browns at Sheffield, during which time he was responsible for the design and commissioning of an 8,500 kVA arc furnace. From 1928 to 1935, he was technical assistant to the West Midlands J.E.A., being engaged on the specification, design and construction of Ironbridge power station. He served an apprenticeship with B.T.H., and after a period on power station testing work was, for a time, technical assistant to the chief electrical engineer of the I.C.I. works at Billingham.

To mark his retirement after 29 years' service as mains engineer at Nuneaton, **Mr. F. Nicklin** has been presented with a briefcase by colleagues and friends. His experience in the industry dates back to 1906, when he started with the Ilkeston Corporation Electricity Department.

Already well-known in shipping circles, **Mr. J. R. C. Johnson** has been appointed manager of the Contracts Division of the Marconi International Marine Communication Co., Ltd. Previously contracts representative, he will continue to operate from Marconi House, Strand, W.C.2. He started with the Marconi Marine Co. as a seagoing radio officer in 1917 and, apart from considerable experience afloat, spent a period on installation and maintenance work ashore in London.

Mr. J. R. C. Johnson

It is announced by the General Electric Co. Ltd. that **Dr. C. C. Garrard,** PH.D., M.I.E.E., M.AMER. I.E.E., M.BRIT. I.R.E., F.I.A.A., F.I.M., who has been a director of the company since May 1943, retired from that position at the end of June. This means that he has also relinquished the position of resident director of the company's Witton works—a position he has held since 1946—but we understand that he is being retained in an advisory capacity. Dr. Garrard became manager of the firm's switch and transformer works in 1908, after earlier experience with Ferranti Ltd. From 1943 to 1946 he was joint general manager of the company's engineering group. A past chairman of the I.E.E. South Midland Centre, he has served on numerous E.R.A. committees. He is author of "Electric Switch and Controlling Gear," which is recognised as an authoritative work on that subject.

Dr. C. C. Garrard

Mr. H. J. Johnston, distribution engineer with the South Western Electricity Board's South Bristol district, has relinquished his post to join the board of Llewellins and Jones Ltd.

As President of the International Federation of Business and Professional Women, **Dame Caroline Haslett,** D.B.E., J.P., left for Berlin last Saturday, to speak to the Berlin Business and Professional Women's Club. She is also speaking to the Hamburg Club and to the Danish Federation in Copenhagen. She will then go to Sweden to preside at the Sixth Triennial Congress of the International Federation which opens in Stockholm on July 5.

The appointment of **Mr. E. R. Weech,** chief engineer of Bastian and Allen Ltd., as a director of the company, we referred to last week, and we are now able to reproduce his photograph. Mr. Weech has been with that company for eighteen years, and gained earlier experience in the United States where he specialised in switchgear and automatic controls.

Mr. E. R. Weech

Ekco-Ensign Ltd. announce the appointment of **Mr. J. W. D. Le Lievre** as their representative covering certain parts of the Manchester area. He will operate from the company's northern sales office at Kent Street Works, Preston, Lancs.

Following the retirement on June 30 of **Mr. J. R. Jones,** M.I.E.E., sub-area manager of the North Western sub-area of the London Electricity Board, **Mr. C. W. Blake,** has been made responsible for the management of that sub-area in addition to his present position of manager of the Board's Western sub-area. It is understood that the sub-area and district organisation in the North Western sub-area will continue to function as at present, but we gather that in view of the present reorganisation of the Board's structure, Mr. Blake will fill the dual role, although the matter is subject to later review. Mr. Jones, who has retired, was, prior to vesting day, general manager and engineer of the Battersea borough council electricity undertaking from 1946. Earlier he had been at Hammersmith since 1936—from July 1939 as chief electrical engineer and manager. In his younger days Mr. Jones had 18 years' service with the North Eastern Electric Supply Co., 13 of them in power stations at a time when that company was considered to be a pioneer in power station development. He assisted with the early experiments with pulverised fuel. Later he had five years as distribution engineer, four years at Newport (Mon) as station superintendent, and nearly four years at Watford as chief assistant engineer, before going to Hammersmith as deputy chief electrical engineer and manager, where he later rose to the senior position.

OBITUARY

Mr. A. F. Bock, who was manager of the Birmingham district office of the Metropolitan Vickers Electrical Co. Ltd., for 26 years, died on June 21. He retired only last September. Mr. Bock served his apprenticeship at the Trafford Park Works and later joined the Plant Department, but after war service he went to South America, representing the company in Chile and Peru for four years. Returning to this country, he was attached to the London office for a time prior to becoming manager of the Birmingham office in March 1926.

It is with real regret that we record the death on Saturday last, June 27, of **Mr. S. G. Rattee,** A.M.I.E.E., who for the past 13 years had been editor of our contemporary, *The Electrical Journal* (formerly known as *The Electrician*). He had been associated with that journal since 1927, and had previously been one of a group of editors responsible for publications of Radio Press Ltd. In recent years Mr. Rattee's health had been rather poor—he suffered with his heart—but dispite this disability he remained a cheerful and very friendly character whom we, and his many other friends, will greatly miss at future functions.

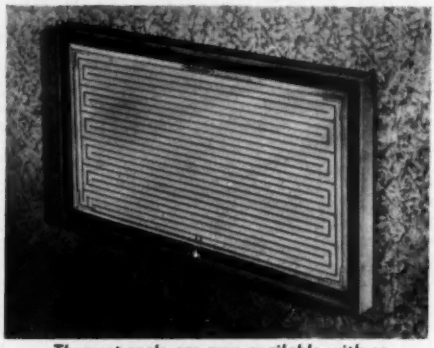
Mr. S. G. Rattee

The BUYER'S *Column*

"Thermopanels" are New

TO be available for the coming "heating" season are a new range of Thermopanel "Radiant glass" heaters marketed by E. K. COLE LTD., Southend-on-Sea, Essex, seen below.

Intended for wall-mounting, these heaters are unusual in that the element is fused directly into the back of an armour plate glass panel.



Thermopanels are now available with or without a frame

There is no danger of injury caused by contact with the heater because of low conductivity and the absence of glowing heater wires.

Two types of Thermopanel are available, RGF with a wall frame for use where appearance is important and RG without frame and suitable for industrial and commercial application in sizes and ratings as under.

RG75 750 W 24¼ in. x 16¼ in. x 1½ in. 11 lbs. in weight. Price £10 1s. 4d. (inc. P. Tax)

RG1 1 kW 32¼ in. x 16¼ in. x 1½ in. 15 lbs. in weight. Price £12 (inc. P. Tax)

RGF757 50 W 27¼ in. x 19¼ in. x 2 in. 18 lbs. in weight. Price £13 3s. 3d. (inc. P. Tax)

RGF1 1 kW 35¼ in. x 19¼ in. x 2 in. 24 lbs. in weight. Price £15 9s. 9d. (inc. P. Tax)

Now an Instrument "Solon"

FOR soldering work in the radio, television, electronic and similar industries, W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., 51-53 Hatton Garden, London, have introduced an instrument model "Solon" soldering iron.

List No. 625, this new model weighs only 3½ oz and is 9 in. long; its small dimensions allowing it to be used pencil fashion. Consuming 25 W and suitable for 220/240 V supplies, the irons cost only 19s. 8d. each, list.

The bit and bit holder are produced from high-conductivity copper and nickel plated; the bit diameter is 1/16 in. and it is easily replaced. The element is in a steel case but is again readily replaceable. The plastic handle is in two parts.

New Day Price Changes

WE hear from NEW DAY ELECTRICAL ACCESSORIES LTD., 136 May St., Balsall Heath, Birmingham 12, that the following amended list prices took effect from June 22, 1953, and these prices should be used with Catalogue GC/53/1.

ONE-GANG			TWO-GANG			THREE-GANG		
Cat. No.		*Price per doz.*	*Cat. No.*		*Price per doz.*	*Cat. No.*		*Price per doz.*
		s. d.			s. d.			s. d.
111	brown	30 0	121	brown	59 8	120	brown	124 0
111a	ivory	35 0	121a	ivory	75 8	120a	ivory	150 0
112	brown	40 0	122	brown	79 8	124	brown	94 0
112a	ivory	45 0	122a	ivory	95 8	124a	ivory	120 0
			123	brown	69 8	128	brown	104 0
			123a	ivory	85 8	128a	ivory	130 0
						129	brown	114 0
						129a	ivory	140 0

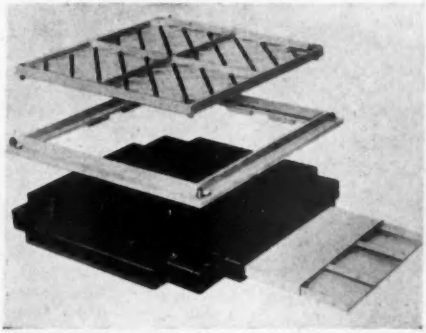
G.E.C. Redesign Duct Junction Box

IN view of the complexity of electrical services in modern commercial buildings and the consequent pressure on the use of steel floor-duct systems, the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, have now redesigned the junction boxes of their under-floor duct distribution system to cope with today's requirements.

These boxes are fabricated with aluminium alloy sides, steel plate bases and cable intersectors. They are now available either 2 or 2½ in. deep with floor frames and traps ¾ or 1 1/16 in. deep, an important feature where the depth of screed over precast concrete is restricted.

Socket-type outlets are made in the sides and conduit outlets are provided at the corners. The side outlets can be for two, three, four or five ducts or they may be replaced by plain sides suitable for conduit outlets.

Where the floor fill is so shallow that it will not accommodate these assemblies, shallow cable channels are available in heavy-gauge steel sheet



This "exploded" view shows main features of the redesigned junction box

for one, two, three or four-way patterns. Junction boxes used in conjunction with these cable channels are similar in design to those mentioned earlier but the minimum depth base to floor level is 1⅜ in. Sides are available for cable channels of the following dimensions: 4⅜ in. wide by from ½ to 1½ in. deep; 7½ in. wide by ½ to 1½ in. deep; 8½ and 10½ in. wide by from ½ to 2 in. deep.

Following on the call for less expense in housing, the company has cut the price of standard lines of conduit fittings by 12½%. This has been achieved by simplifying methods of production, and at the same time developing new products for building purposes.

The "Agaphone"

RECENTLY introduced to the trade in this country is the "Agaphone" wire recording dictating machine made by a Swedish concern and marketed here by M. AND L. HAYCRAFT LTD., 24 St. Stephens House, Cannon Row, S.W.1.

Designed for normal dictation or conference recording, the "Agaphone" uses wire as recording medium. This is housed in magazines said to be foolproof and giving 60 minutes continuous recording.

Unusual features of this otherwise orthodox recorder are a time control device which enables dictation to be automatically located for playback and a signalling device by which the executive can warn his secretary of remarks and instructions that are not to be transcribed. Key controls make the machine simple to operate, whilst in addition there

The Agaphone is compact

is a foot pedal provided which enables the secretary to control the machine without leaving her typewriter keyboard.

Small and compact, the "Agaphone" weighs 17¾ lb. and is equipped with voltage adjustments so that it can be used on most existing supplies.

Westminster Chimes

IN our note about "Westminster Chimes" in our last issue we regret that the name of the manufacturer was spelt wrongly. It should read: V. AND E. FRIEDLAND LTD.

We have been informed that the purchase tax chargeable on these chimes has now been assessed as £3 3s., making a total retail price of £11 11s.

TRADE PUBLICATIONS

WATER HEATING.—Hints for the use, care, service and maintenance of Santon water heating equipment have been published in booklet form by Santon Ltd., Somerton Works, Newport, Monmouthshire.

METERS.—Completely overhauled and reconditioned prepayment and credit meters, m.d. indicators and rent collectors are supplied by The Electric Meter Company, Castle Circus House, Torquay.

COMMUNICATIONS.—The A.T.M. Soundmaster intercommunication unit is described in new publication No.1180, issued by Automatic Telephone and Electric Co., Ltd., Strowger Works, Liverpool 7.

TELEMETERING.—Electronic impulse frequency telemetering systems are described in publication D/RC 11 of which a second edition has been published by Standard Telephones and Cables Ltd., Oakleigh Rd., New Southgate, N.11.

ACCESSORIES.—List GC/53/1, newly published by New Day Electrical Accessories Ltd., 136-8 Mary St., Balsall Heath, Birmingham 12, features what the firm describes as "a new departure in accessories technique."

FANS.—Electric fans are now becoming more and more necessary and it is appropriate that Revo Electric Ltd., Tipton, Staffs, have published a brochure showing the many fan models they produce.

LIGHTING.—Siemens Electric Lamps and Supplies Ltd., 38-39 Upper Thames Street, E.C.4, have just produced new publications dealing with the New City Lantern (1026), the Cathay Lantern (1025), the New Capital Lantern (1029), Infra Red lamps for pig and poultry rearing (1027, 1028).

FURNACES.—Latest publication VH453 by Wild Barfield Electric Furnaces Ltd., Elecfurn Works, Watford By-pass, Watford, Herts., is about vertical hairpin furnaces.

ELECTRONIC TUBES.—Ferranti Ltd., Hollinwood, Lancs, have now published a useful loose-leaf binder containing a "Technical Handbook on Valves and Cathode Ray Tubes."

BELLS AND BUZZERS.—The complete range of bells, buzzers, pushes, transformers and transformer lights, which are marketed by V. and E. Friedland Ltd., Macclesfield, Cheshire, is described and illustrated in their latest export catalogue in which the information is provided in English, Spanish and French.

WIRES.—"Fifty-three" enamelled winding wires and their characteristics are featured in leaflet 328, published by British Insulated Callender's Cables Ltd., 21 Bloomsbury St., W.C.1.

The WEEK in NEWS

The Case for Illuminated Signs

E.S.M.A. joins Campaign to Defend Electricity

UNDER the above title the Electrical Sign Manufacturers' Association has just published an attractive booklet, and as its name suggests, presents in pictures and statements by prominent personalities in that section of the industry, the numerous advantages of electric signs. The publication is particularly significant, however, because it is the first piece of positive propaganda undertaken by the Association. Previously the only propaganda work done by that organisation was in connection with the lighting restrictions. Reason for this "break with tradition" is the burden imposed on sign manufacturers and users by the Town and Country Planning Authorities, and it is in an effort to educate lighting and planning authorities and M.P.s. with the knowledge that signs serve a very useful purpose that the booklet is being distributed. Indications at present are that antagonism towards illuminated signs is growing and this piece of publicity work is intended to ward off possible future trouble.

Added fillip to publication has undoubtedly been given by the two recent cases in London when the suitability and appearance of advertisements in Trafalgar Square and Ludgate Circus were challenged. No decision has yet been reached as regards the former, but the result of the Ludgate Circus enquiry went against the advertisements, mainly, it seems, because they were on the processional route to St. Pauls. On the whole, the Association is not particularly worried about these cases, we understand; they are the only two instances in London and there have not been many cases in the rest of the country. The Association agrees there should be control over these advertisements but maintains that the control is operated in the wrong way. Moreover, it takes about two months to obtain planning approval. Only chemist signs and those inside windows are at present free of control, but broadly, about 90% of applications are approved, although there is a tendency towards greater discrimination.

About 5,000 copies of the booklet are being distributed. They are being despatched to the appropriate Government Departments, to local authorities, trade associations, planning organisations, and M.P.s.

BRAZILIAN IMPORTS

BANK OF BRAZIL'S Import/Export Dept. has drafted new import regulations scheduled to take effect from July 1. Main feature is the division of goods into 26 groups eligible for import. Each will be opened for licensing for a period of 30 days at the beginning of each week during the second half of 1953.

CONTRACT FOR CROSS-CHANNEL CABLE SCHEME

CONTRACT for the sea trials in the cross-Channel cable project announced by the B.E.A. last week has been awarded to British Insulated Callender's Cables, Ltd. That company will work in close liaison with W. T. Glover and Co., Ltd., whose 132 kV gas-filled cable has been chosen for the trials. The cable accessories have been designed by B.I.C.C., who will also carry out the installation work. As reported in last week's issue (page 1181), cable-laying trials are to be undertaken off Dover this summer. The P.O. cable-laying ship *Alert* will lay two half-mile lengths of cable which will be joined at sea to a 300-yd length of French manufacture. After tests on the sea-bed, they will be recovered for further tests at the works, which will be completed by the end of 1953.

Electronics Co. Bought

WE hear that Pye, Ltd., has acquired the whole of the issued share capital of an electronic instruments manufacturing concern. The name of the company concerned has not been disclosed, but it has been stated that it is one of the leading firms in its field.

The First Half-Century

We had the very interesting and comparatively rare experience of being present at the inaugural meeting of a new scientific society, namely the Faraday. This society, which is presided over by no less a light in the electrical and chemical world than Dr. Swan, held its opening meeting at the Chemical Society in Burlington House. The meeting was very well attended, about 50 members being present, and we noticed with satisfaction that the heads of the scientific and educational departments of several of the London Technical Institutes, such as the Borough Polytechnic, Northampton Institute, and Sir John Cass' Institute, were present.—*From our issue of July 2, 1903.*

Australian Import Relaxations in October?

CERTAIN restrictions on trading with Australia continue in force. Some general remarks about the future conditions in this connection were made by Mr. S. F. Ferguson, director of Australian Association of British Manufacturers in Sheffield last week. He said that import quotas would probably be enlarged this year, and named October 1 as a likely date. Mr. Ferguson warned manufacturers that they would have to fight to regain their Australian markets.

Production costs in the Commonwealth had risen enormously Mr. Ferguson told the City's Chamber of Commerce, and Australians would probably demand higher tariffs on British goods. The (Australian) Government was being urged not to abolish restrictions completely but only to review them, and also for a general revision of tariffs.

No Preference for M.K.S. Units

ALTHOUGH so much has been written about the advantages of the M.K.S. system of units, it seems that industry is not yet fully decided on the merits of the system for everyday use, at any rate for magnetic measurements. The N.P.L. recently conducted an inquiry amongst its clients, as to whether they would prefer the results of magnetic measurements to be quoted in c.g.s. units as at present, or in M.K.S. units.

Because a considerable proportion of the inquiries elicited no reply, the investigation can with certainty only be taken as showing that there is no mandate for an immediate change. Of the 39·5% of inquiries which drew replies, 14·6% showed a preference for c.g.s. units as at present and 10·4% a direct preference for M.K.S. units. A further 10·4% of the firms questioned considered that the M.K.S. system would inevitably come into use, and that its early adoption was therefore desirable, 4·1% had no views.

Those concerned were also asked about the type of unit they preferred if the M.K.S. system was adopted; 12·5% said fundamental, 7·3% decimal derivatives, and 9·4% amps/cm and Webers/cm^2.

Opening of New Lab. at Queen Mary's College

A SIGNIFICANT inauguration ceremony took place at Queen Mary's College, University of London, on Tuesday, last week. Sir George Nelson, chairman of English Electric and Governor of the College, officially opened the Nuclear Particle Laboratory. This is probably the first time in this country that applied nuclear physics has been instituted as part of the undergraduate engineer's education.

Among equipment in the main laboratory are a 1 MV impulse generator, an 8 MV single impulse betatron and 1 MV Van de Graaff generator. In other rooms are an electron microscope, apparatus for experiments on conduction in high vacuum, and radio-active counting equipment.

STATISTICS ON INTERFERENCE

SOME quite remarkable data was issued last week by the G.P.O. on complaints and the causes of interference to sound and television broadcasting. All complaints investigated during 1952 have been analysed and although it would take too long and too much space to give the many figures in full, some examples should prove of interest. It has been found, however, that known causes of interference are seldom reported. Inefficient aerial-earth systems appear to be the main causes of interference, numbering 8,140 cases with sound and 1,827 cases with TV broadcasting. Faulty receivers were high on the list in both cases, and faulty wiring in the case of radio sets. Sewing machine motors were another big cause—topping the list with TV reception with 9,936 cases and fifth with radio sets, 1,641. Other domestic appliances reported frequently were refrigerators, hair dryers and vacuum cleaners. A little surprising was the comparatively low number of cases of motor car ignition causing interference to TV sets. They numbered 1,778, or 3·4% of the total number of cases "closed."

Sir George Nelson (left) with Mr. R. L. Fortescue, in charge of the laboratory, and Prof. W. J. John, head of the electrical dept. (right), at the opening of the new nuclear particle laboratory at Queen Mary's College

Extra £1½m for Rural Development will Help

FIRST comment on the extra capital allocation for rural electrification announced by the Minister of Fuel and Power recently, came from Ald. W. S. Lewis, chairman, Midlands Electricity Board. He has given an assurance that whatever sum was allocated to the Board, it would be used to the full for that purpose. Expenditure in the Area last year on rural schemes was £615,000, but it was not yet known what proportion of the additional £1½m. would reach the Midlands. At present just over half of the total of 26,500 farms in the Area have an electricity supply, 5,900 of which had been connected since vesting day.

Comments on the extra £1½m. for rural electrification were also made last week by Mr. C. R. King, chairman of the neighbouring E. Midlands Electricity Board. He said the sum was to be spread over a period of 18 months and, when divided among the 13 boards—London excluded—would amount to about £70,000 as far as the E. Midlands was concerned. This represented only a 10% increase on what was already being spent and would hardly solve all the problems, but it would help to accelerate rural development. Mr. King said they preferred farmers to spend their money on equipping farms with electrical apparatus rather than on capital contributions, and that policy would continue.

Rural electrification in the S. Western Board's area received prominent publicity when the subject was featured last Friday in the B.B.C.'s West Region feature "Week in the West." One fact mentioned by the B.B.C.'s reporter was that to connect all potential consumers in the area it would cost £17 million and require over 10,000 new transformers and nearly 9,000 miles of distribution lines.

Information for Research Workers

THROUGHOUT Europe and this country much research work is being carried out in efforts to conserve raw materials. Economy, preservation and substitution by other more plentiful properties are among subjects being studied, and not least in relation to fuels. However, enquirers on the subjects concerned do not always find it easy to discover sources of information, so that the sub-committee for Co-operation in Scientific Research and Technical Development of O.E.E.C. has compiled a list of such sources. Information available covers work being done in Austria, France, Germany, Italy, the U.K. and Sweden. As regards fuels, the list includes Economy in Domestic and Industrial Equipment, Use of Low-Grade Coals, Gasification of Solid Fuels, Hydro and Thermal Power Plants, and Wind Power for Electrical Generation. Information is available from D.S.I.R.'s, Technical Information and Documents Unit, Cunard House, 15 Regent Street, S.W.1.

E.I.B.A. Branch A.G.M.

DATE has been fixed for the E.I.B.A.'s Hants and Dorset branch annual meeting. Secretary Mr. A. Cadman has informed us that it will take place at British Electricity House, 111 High St., Portsmouth, on July 31 at 4.30 p.m.

£1m Deficit for S. Western Board?

IN a letter to the Somerset Boroughs and U.D.C.s Association recently, the S.W. Electricity Consultative Council warned that the Area Board might sustain a deficit of £1m. early next year. The letter followed representations about the build-up of the Board's deficit and the possibility of increased tariffs. The Council pointed out the difficulties of distribution in the area, and mentioned a system of pooling with other areas where there might be a surplus. The association decided to await developments.

OFFICIAL PUBLICATIONS

ELECTRICAL SAFETY IN HOSPITALS. Notes on precautions against electrical accidents in hospitals, by Min. of Health.

DEFENCE SPECIFICATIONS, 1060 AND 1061: Refrigerators for use in all climates and in temperate climates, capacities 3-25 cu ft. H.M.S.O. 1s. 6d. each.

OVERSEAS ECONOMIC SURVEY. Japan. H.M.S.O. 4s. 6d.

Conditions in Burma

A SMALL pamphlet outlining briefly the commercial conditions prevailing at present in Burma, has just been published by the Board of Trade. For anyone contemplating attacking the Burmese market for the first time, it will provide an admirable background, but the facts given are only general. In its brief reference to trade with the U.K., figures indicate that our exports of electrical goods and apparatus have been steadily increasing since 1949.

Nationalisation—not Regionalisation

AT a recent meeting of Bristol Trades Council, Mr. W. Waring, secretary, asked that a campaign be initiated for the subsidising of one area by another, so far as electricity charges were concerned. He suggested the support of local M.P.s, other trade councils and interested parties be obtained. What was required, he said, was nationalisation, not regionalisation.

Golf in Torquay

UNFORTUNATELY we were unable to include the results of the Golf Competitions held during this year's B.E.P.C. in our last issue. The matches were in aid of E.I.B.A., and we note that the Men's Stableford competition for the G. P. Dennis trophy, was won by Mr. E. J. Corbett of the N.E. Electricity Board with 35½ points. Runner-up, just one point behind, was Mr. C. O. Boyse of B.I.C.C. The new Lady Citrine Rose Bowl in the Ladies' competition was won by Mrs. J. E. Belliss with 41 points.

Complaint about Electrical Tenders

FYLDE branch of the Electrical Contractor's Association have written to Fleetwood town council asking for a revision of the council's policy when seeking tenders for electrical installations. The letter complains that the North Western Electricity Board were also invited to submit tenders which, they contended, was unfair. The Board supervised the installation and could consequently set off the amount charged for that work. Replying to the allegation, the Borough Surveyor pointed out that technical supervision was carried out by a separate department of the Board, and no adjustment of that nature was made. Giving an example of how tenders had been placed, he said that eight contracts were put in hand on the West View housing estate and private contractors had secured six of those to the Board's two. Only in those two cases had the Board submitted lower quotations.

LIGHTING THE ABBEY

ENGINEERS entrusted with the lighting in Westminster Abbey for the Coronation ceremony undoubtedly had an exacting task for that important occasion. In addition to normal requirements, a high standard of intensity, diffusion and colour rendering were required for colour filming and television, while the dignity of the surroundings had to be maintained. The installation was planned by the Ministry of Works and Holophane Ltd. Equipment used comprised 144 specially designed 1000 W projector fittings and class B projector lamps installed at a height of 70 ft which is level with the apex of the arches. At the same time candelabra fittings were adapted to accommodate gold-tinted reflectors with 550 W dimmer-controlled lamps. Overhead floods were also provided.

M.o.W.'s Contracting Scholarships

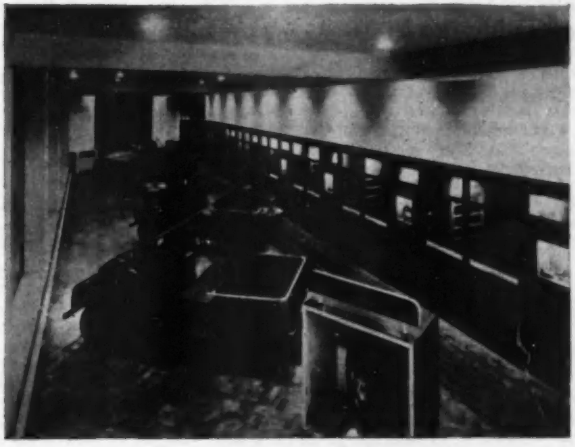
AN announcement by the Ministry of Works last week-end names the winners of the first scholarships awarded by the Apprenticeship and Training Council for the Electrical Contracting Industry. The scholarships are tenable for three years and are for degree courses at a University, or for Higher National Diploma Courses at a Technical College. All fees, examination expenses and maintenance allowances are covered. Winners are students at the Poplar and Maidstone Technical Colleges. Written examinations were held last April in London, Cardiff and Manchester, but final selection was after personal interviews.

Unfair Trading?

ALLEGATIONS of unfair trading were made by N. Ireland Chamber of Trade in Belfast against the Electricity Board. Main complaint was that the Board had enclosed with its accounts a notice stating: "Buy your electric lamps from the Board's local office at manufacturers' authorised prices." This, the Chamber maintained, was misleading in that it gave the impression that the Board sold lamps at a cheaper price than other retailers, although the words used were correct. A deputation was appointed to bring the matter to the attention of the Minister of Commerce.

Ironmongers to Have Own Lamp Brand?

IRONMONGERS may soon be selling their own brand of electric lamps. The introduction of an N.F.I. lamp was referred to by Mr. Lewis Hall, chairman of the electrical section committee, when he presented his annual report at Southport. He added that it was hoped the new lamp would be an accomplished fact before the end of the year. Commenting on the lamp, Mr. Hall said it would be efficient, fully tested, and subject to the usual guarantees. It would be sold cheap and its main purpose, it is understood, is to compete with those sold in multiple and other big stores. Mr. Hall added that his committee were aware that ironmongers had to be competitive. Ironmongers were, of course, prominent electrical retailers in the early days before the contractors took over the largest proportion of electrical sales.



As attractive as the modern departmental store is this car showroom of Arnold G. Wilson in Leeds. British Thomson-Houston Co., Ltd. supplied the fluorescent and tungsten lamps and fittings to light the showroom, offices and workshops. Forty-five 150 watt reflector spotlights have been mounted in special fittings recessed flush to the ceiling

Immersion Heaters on Hire Again

E. MIDLANDS BOARD announced last week that consumers will again be able to hire immersion heaters. Cookers and wash-boilers are available at present on quarterly rentals, but the system as regards immersion heaters was shelved during the war because of shortages of materials. Rent will be at the rate of 6d. a week, or 8d. where there is no wiring. Installation will include the heater, control switch, thermostat, and lagging jacket.

Hungary's Scheme to Solve T.V. Problems

TELEVISION is to be introduced in Hungary next year and in order to solve some of the problems which will arise, the Academy of Science has announced a competition for inventors. Each entrant is to get a premium of up to £150 and all the technical assistance he may require, and if he should solve the particular problem set, he will receive up to £600.

The problems were listed under nine headings in the Hungarian Press some time ago. They include methods of calculating and planning aerials and design and manufacture of receiving and transmitting tubes etc., preparation of sound insulating materials for studios, and planned layouts for studios.

Columbia Development

A MOST interesting talk was given to the Batti-Wallahs Society last week by Mr. G. S. Gibson, Administrative Assistant to Agent General of British Columbia. Although scheduled to talk on hydro-electric power, Mr. Gibson was only too pleased, he said, to be able to talk on lumber instead. He commented on the economic position and criticised Britain's financial restrictions on emigrants. The next luncheon will be on Wednesday, July 29, when Dr. Topping will be the speaker.

A new Magnet House—home of the G.E.C.—has been opened in Union Street, Plymouth. This picture, taken in one of the showrooms after the opening ceremony, shows Ald. H. G. Mason, chairman of the City's Reconstruction Committee, the Mayor and Mr. Leslie Gamage. Manager of the new branch is Mr. S. Hack

NEWS IN BRIEF

Book of Remembrance containing 214 names of Metrovick employees who died during the 1939-45 war has been placed in the entrance to the company's main offices at Trafford Park, where it lies on an illuminated desk surmounted by a bronze sword.

According to usual custom, Hoover, Ltd., have printed in pamphlet form the text of Sir Charles Colston's annual address to his shop stewards.

A Brush Industrial type electric vehicle, equipped with an inverted tower ladder, has been adopted by Public Records Office at Hayes, Middlx., for removal of large quantities of documents and papers.

Eighth annual golf tournament of the Aluminium Development Association took place at Leamington Spa last week.

Report of the Council for 1952-53 has just been published in booklet form by the Association of Consulting Engineers.

Two all-electric swing-tray baking ovens are being installed at new all-electric bakery of Chester Co-operative Society, Ltd. The 375 kW ovens were made by the General Electric Co.

To illustrate the achievements and potentialities of instrumentation and control, the British Industrial Measuring and Control Apparatus Manufacturers' Association has produced its first handbook. B.I.M.C.A.M. are at 21 Tothill Street, S.W.1.

The Television Society has built an experimental 405-line transmitter to operate on 427 Mc/s with a peak power of 12 W. Equipment is being installed at Norwood Technical College, and in addition to providing test signals it will serve as a demonstration for students attending the training classes.

Employees of Electric Construction Co., Ltd., are to receive 1s. 10d. in the £ on their wages (less cost of living bonus) as their share of the company's profits during 1952-53.

Coronation week was "Open Week" at B.I.C.C.'s Helsby works. Over 2,000 relatives and friends of employees visited the factory.

Marryat & Scott have secured a contract for the installation of 15 lifts in the south-east passenger handling building at London Airport.

Work has begun on a new 3,300 tons cable ship for Cable and Wireless, Ltd. The vessel will be the 23rd built by Swan Hunters and the largest in the Cable and Wireless organisation.

A supper and cabaret, a luncheon, and a dinner and cabaret formed part of the coronation celebrations enjoyed by Telcon employees.

Speaking in Norwich last Friday, Mr. P. Honey, of E.D.A., criticised the policy of cutting down the number of power points in new houses so as to effect economy.

Questions in Parliament . . .

Monopolies Commission

In a written answer, Mr. P. Thorneycroft said he was unable to make a statement regarding further references to the Monopolies Commission, but he hoped to announce soon the reference of at least one new subject.

Pedestrian Crossings

A number of questions were asked last week about the progress being made in the illumination of Belisha beacons at pedestrian crossings. Mr. G. Braithwaite said local experiments had finished and authorities were now equipping the beacons with lights, which work should be completed by next winter. He added that local authorities were co-operating in trying to achieve the maximum degree of uniformity in the installation of flashing beacons.

TV in the Highlands

Mr. D. Gammans told the House last week that provision of television in the Northern Highlands could not be contemplated for a very long time to come. He said the cost of extending service to that area would be very high because not only would TV stations be needed but also long connecting links for distributing programmes from the existing network.

Hire Purchase

President of the Board of Trade rejected a suggestion last week that in view of improved steel supplies, he should consider excluding electric washing machines from the Hire Purchase and Credit Sale Agreements Order. He said the restrictions were still necessary in existing economic conditions.

Chief Joseph Dam

Congratulatory comments were made in the House last week following the eventual acceptance of a British tender for the American Chief Joseph Dam project. Later, however, Mr. G. R. Strauss asked whether the specification was the same in the second tender, because if it was, the Westinghouse Co.'s reduction would be grossly unfair. Mr. Thorneycroft said in neither invitation were the quantities or weights of materials specified, which was one of the excuses made for the second round of tenders.

Technological Studies

Mr. J. Johnson asked what portion of the counterpart funds for U.S. economic aid will be allotted to promoting studies in technological subjects at technical colleges. Mr. Thorneycroft said a decision had not yet been reached, but he hoped to make an announcement shortly.

Rural Supplies

The following percentages of farms in the Eastern Board's Area which had received a supply of electricity were given by Sir T. Dugdale last week: Chilterns 65%, Essex 40%, Fens 45%, Norfolk 55%, North Met. 90% and Suffolk 50%.

Later in the week Sir Thomas gave figures showing electrical development in rural areas in two other parts of the country following questions by Mr. Slater and Mr. Gower. As regards the N.E. Electricity Board's Area, last March there were 909 farms connected in the Tees sub-area, or 22% compared with 26·9% throughout the whole Area. At the same time about 17·4% of farms in the S. Wales Board's Area were connected compared with 41·6% in the whole of England and Wales. He also gave percentages representing each of the Area Boards. In a written answer, Sir T. Dugdale stated that about 55% of farm holdings in Norfolk were connected to the mains and about 850 applications were outstanding.

Solid Fuel Appliances

One of the last clauses considered in debates on the Finance Bill was that dealing with taxes on solid fuel appliances. An amendment sought to allow expenditure on approved appliances to be offset against Schedule A tax payments. Main argument in favour was the Ridley Committee's recommendation that financial assistance be given to installations of fuel saving equipment, the desirability of which was generally accepted. Moving the amendment Mr. A. Crosland said an important result would be the saving in terms of capital cost where those appliances replaced electric fires and other domestic electrical equipment. A large proportion of electrical appliances were used at peak hours and the capital cost to the country of having them in the home was consequently enormous. It lead to capital expenditure of a serious nature and enormous magnitude on generating plant, he said. A general switchover from electricity to solid fuel in the home might mean a great saving in terms of capital cost in the electricity investment programme.

Replying to the debate, Mr. Maudling answered the argument regarding relative efficiency in coal consumption of solid fuel and electrical appliances. He said whatever was done there would still be substantial discrimination in favour of solid fuel. They bore no purchase tax whereas the electric fire carried a 75% tax, nor were solid fuel appliances subject to hire purchase restrictions.

Coal Stocks

Mr. G. Lloyd was questioned on Monday concerning the possible shortage of house coal during next winter. The Minister admitted the situation was a difficult one, but expressed confidence that we would get over the problem with the full co-operation of the N.C.B., merchants and general public. He said he was glad there was anxiety because it was justified, and better to realise the position now than be taken by surprise in mid-winter. Everybody in the industry was working hard, he added, in connection with the matter. Causes of the shortage were said to be the Coronation and additional holidays, which would involve a total loss of some 4¾ million tons.

Electric Supply News . . .

Ayrshire

A scheme, estimated to cost £20,127 to reinforce the network in Girvan, Ayrshire, has been approved by the South West Scotland Electricity Board. The reinforcement will be effected by a changeover in the network from 3·3 kV to 11 kV operation. The Board has also approved schemes estimated to cost in total £109,000 to provide a supply to 445 new houses being erected at Mains No. 2 and No. 4 Sites, East Kilbride, 222 at Larkfield Site, Greenock and 1,118 at Arden, Thornliebank.

Barrow

The first of four 30 MW turbo-generators at Roosecote power station, Barrow-in-Furness, is expected to be put into operation in September, it is reported. Construction of the station began in 1950.

Belfast

For the year ended March 31 last, the Corporation electricity undertaking made a net profit of £102,939, it has been reported to the Electricity Committee. Revenue totalled £2,245,239—an increase of £158,592, but working costs also rose by £163,154 to £1,796,202.

Bridlington

The Rural District Council are to ask the Yorkshire Electricity Board to consider placing all new power lines underground. The matter was raised when considering an application of the Board to erect o.h. lines to three farms in the district. If underground lines are not possible the Council has asked that o.h. cables should go along hedges or roads to be of use if new houses are built nearby.

Carrington

The sum of £6,000 is to be spent on shoring up the bank of the River Mersey where the pump house feeding the Carrington power station is situated.

Isle of Man

The question of rural electrification by the Isle of Man Electricity Board was again discussed in Tynwald recently. After a member had moved a vote of £28,000 to enable the Board to supply electricity to farms, another put in a plea on behalf of the 31 farms at Cronk-y-Voddy (to which we referred on May 7). It was emphasised that money was limited, and as it would cost £34,811 to supply the farms at Cronk-y-Voddy, it was proposed to do the greatest amount possible with the money available.

N. Ireland

Derry Rural Council has been notified by the Electricity Board for Northern Ireland that the question of supplying electricity to the west side of the River Foyle depends upon contemplated amendments to the Electricity Supply Act, 1948. As soon as legislation is completed it is proposed that the Board's engineers should carry out a local investigation.

North Wales

Utilising the coastguards rocket equipment, officials of B.I.C.C. and the Merseyside and North Wales Division of the B.E.A. recently erected a new power line across the Aber Gorge near the famous falls. So skilfully were the flight and distance (475 yards) judged that the first shot carried the line close to the foot of the pylon at which it was aimed. The cables were subsequently hauled across without difficulty, thus preventing damage to trees in the gorge.

Peak District

In its first annual report the Peak Park Planning Board states that the four electricity boards serving the park area have agreed to give advance notice of electrification schemes which will then be fully investigated and if necessary modified to conform with the highest amenity requirements. Where conditions effectively preclude any alternative, the report adds, underground construction has been requested and the authorities concerned have in all instances agreed to adopt this method of supply.

LIGHTING SCHEMES

Bridgwater.—T.C. proposes to extend its sodium lighting to Bath Road, King Square and the junction of the Quantock and Wembdon roads.

Cambridge.—In regard to a street lighting scheme proposed by the council, it has been stated that the University considers that as the introduction of any sodium lighting could be detrimental to the established interests of the University and to important scientific work, it will not make any contribution to providing cut-off type lanterns if used in Modingley Road. This view has been communicated to the M.o.T.

Llandudno.—Street lighting is to be converted from gas to electricity, over about three years, and involving over 600 lamps.

Solihull.—The U.D.C.'s surveyor has recommended the installation of a new type of fluorescent street lighting which can be fitted to the front walls of premises.

Stamford.—T.C. is considering replacing gas lamps by electric lamps in further streets and the borough surveyor has been instructed to make a report.

Warwick.—T.C. has received consent to the extension of the new street lighting scheme from St. John's to Fisher's Brook on Stratford Road.

Company Activities . . .

Aberdare Electric Co.

The offer of one million 5s. Ordinary shares at 5s. 6d. each was opened on Monday, the issue being arranged through the Industrial Credit Co.

Aron Electricity Meter Ltd.

This well-known meter manufacturing concern reports a substantial increase in profits. For the year to March 31 last, the profit is £176,386 compared with the previous year's figure of £96,679. After charging increased taxation the balance amounts to £41,801 (*£34,283*). The dividend is also being raised by a bonus of 5% to a total of 20% for the year.

Delhi Electric Supply and Traction Ltd.

Total resources at May 24 last, of this concern which is in liquidation, amounted to £431,897, the liquidators report. But the figure is subject to substantial legal costs, not yet ascertainable.

Electric Construction Co., Ltd.

A small increase in the net profit after charging slightly higher taxation, is reported for this concern, for the year ended March 31 last. The net profit is £93,503 which compares with the previous year's figure of £89,373. The dividend is again to be 15%.

Hick, Hargreaves and Co.

There is to be a final Ordinary dividend of 15%, making 20% for the year ended March 31 last, the same as before. The net profit, after all charges, including taxation, amounts to £233,076, which is over £71,000 more than for the previous year.

George Kent Ltd.

With a final dividend of 9½% the total distribution for the year ended March 31 last, is again 12½%. The parent company's profit is £214,017 (*£122,944*).

Lightfoot Refrigeration Ltd.

The volume of orders so far this year shows some reduction, Mr. C. P. N. Raikes, chairman, reports, and as a result of reduced demand competition is even more keen, which tends to affect prices and profits. He also remarks on the necessity to arrange for overdraft facilities to augment working capital.

London Electric Wire Co. and Smiths Ltd.

During 1952, home sales were greater than in the previous year, both in volume and value, the latter, of course, being influenced by the high price of copper, it was stated at this annual general meeting last week. But in the latter part of the year trading conditions deteriorated and that state of affairs has persisted, even worsened during the past three months, mainly due to the uncertainty of the future price of copper. Direct export sales of the company were lower than in 1951 due to intense competition in world markets; and it had become increasingly necessary to quote very keen prices and deliveries in order to secure direct business. The relaxation in the granting of building licences had enabled the company to make some progress in the erection of essential buildings. Capital commitments for extensions and new plant for both home and abroad approach £800,000. The new rolling mill in course of erection at the northern undertaking is expected to be in operation during the autumn when, if copper is in plentiful supply, it will help greatly in extending the company's activities.

Marryat and Scott Holdings Ltd.

For the year ended March 31 last, the group net profit is £45,363 after taxation, compared with £37,088 for the previous year. The Ordinary dividend is again 22½%.

Morgan Crucible Co., Ltd.

For the year ended March 31 last, a final Ordinary dividend of 8¾% is recommended, maintaining the total distribution at 12½% for the seventh consecutive year. The group profit is £1,524,056, compared with £1,966,918 for the previous year, after making provision for special stock obsolescence of £104,708 (*nil*). The net profit amounts to £707,987 (*£855,758*), of which £250,000 is placed to general reserve.

Reliance-Clifton Cables and Industrial Products

With substantial increases both in trading and net profits, the results for the year ended November 30 last must be considered very satisfactory indeed. From an investor's point of view too, the further rise in the dividend paid, roughly commensurate with the better results, make the stock attractive. We referred last week to the proposal to capitalise £39,250 of general reserves to be applied in paying up in full at par 39,250 unclassified Preference shares, to be issued on the basis of one for each £4 Ordinary stock held.

Year to Nov.30	£ Trading Profit	£ Net Profit	% on Ord. Earn'd	% on Ord. Paid	Ord. Price High	Ord. Price Low
1948	202,340	99,081	102	25	26/6	18/9
1949	229,911	93,466	106	16⅔*	22/6	16/9
1950	226,733	93,018	109	30†	24/9	18/-
1951	268,378	103,794	123	30	26/10	21/-
1952	418,683	151,966	175	35	26/-	18/6

* For eight months (equivalent to 25%).
† Plus 25% capital bonus.

Dividends Declared

Electric and General Investment Co. Dividend 15% (*same*). Net profit £10,864 (*£9,048*).

Johnson Matthey and Co. Final Ordinary dividend 12%, making 15% (*same*). Group net profit £638,825 (*£580,429*).

Marco Refrigerators. There is to be no interim dividend, as was the case last year, when the final dividend was also passed.

Commercial Information

CONTRACTS OPEN

HOME

July 4.—Newburn (Northumb.) U.D.C. Wiring of 19 houses in Whitehall Rd., Walbottle. J. A. Weatherley, Surveyor, Council Offices. (See June 18 issue.)

July 6. — Bentley-with-Arksey U.D.C. Supply of lanterns, lamps and control gear, provision of underground cable, and supply and erection of columns and fitting and wiring of equipment for sodium lighting along two miles of Gt. North Rd. Engineer and Surveyor, Council Offices, Cooke St. Deposit £2 2s. (See June 11 issue.)

July 6.—Fife. Electrical work in conversion to form agricultural school at Elmwood House, Cupar. Applications to R. Galbraith and Lawson, quantity surveyors, 21 Crossgate, Cupar.

July 6.—Hazel Grove (Chesh.) U.D.C. Supply and installation of columns, 250 W mercury lighting in Group A along two miles of Bramhall Lane and Woodford Rd. Engineer and Surveyor, Council House, Hazel Grove. Deposit £2 2s. (See June 25 issue.)

July 6.—Kingston-on-Thames T.C. Erection, wiring of 14 Group B street lighting columns along five roads. Borough Surveyor, Guildhall. Deposit £2 2s.

July 6.—Northern Ireland. Installation of electrical services in buildings at Holywell Hospital, Antrim. Chief Engineer N.I. Hospitals Authority, 104 University St., Belfast. Deposit £3 3s.

July 6.—West Riding. Renewal of electrical installation at Ecclesfield grammar school. County Architect, Bishopsgarth, Westfield Rd., Wakefield. Deposit £2 2s.

July 7.—Anglesey. Electrical installation in new primary school at Holyhead. County Architect, Shire Hall, Llangefni. Deposit £1 1s.

July 7.—Belfast. Electrical installation at new secondary school extension at Belfast Royal Academy. A. N. Ivens, consulting engineer, Friends' Provident Building, 58 Howard St., Belfast. Deposit £5 5s.

July 7.—Carlisle T.C. Electrical installation in 130 municipal dwellings. City Surveyor, 18 Fisher Street.

July 7.—Fife. Electrical work in erection of new high school at Buckhaven. Frank W. Raynes and Son, Consulting Engineers, 40 Second Ave., Cathcart, Glasgow.

July 7.—Hale U.D.C. Supply and erection of concrete columns, lanterns, 150 W tungsten lamps with associated equipment and wiring for Group B street lighting in Delahays Rd. Engineer and Surveyor, Council Offices, Ashley Rd.

July 7.—Stourbridge T.C. Installation of 57 units of Class A street lighting with mercury lamps and concrete columns, and 11 units of same with fluorescent lamps and concrete columns. G. N. Maynard, Borough Engineer and Surveyor, The Council House.

July 7.—Swale R.D.C. Installation of electricity in 115 houses in district. Engineer and Surveyor, 48 Bell Rd., Sittingbourne, Kent.

July 8.—Rothwell (Yorks) U.D.C. Provision and erection of 34 sodium street lighting units with concrete columns on Haigh Rd. and Oakwood Drive estates. Engineer and Surveyor, Civic Buildings. Deposit £2 2s.

July 9.—Derby T.C. Electrical installation in 100 houses on Mackworth estate. Borough Architect, The Council House, Corporation St. Deposit £2 2s.

July 10.—Heston and Isleworth T.C. Installation of Class A lighting alone about a mile of Staines Rd., comprising removal of columns and lanterns, supply and erection of 49 steel columns, with lanterns 3/80 W 5 ft. fluorescent tubes and control gear. Borough Engineer and Surveyor, 88 Lampton Rd., Hounslow. Deposit £2 2s. (See June 25 issue.)

July 11.—Longbenton U.D.C. Electrical installation in 180 houses at Burradon. A. E. Sweetman, Surveyor, Council Offices, Forest Hall, Newcastle-on-Tyne. Deposit £2 2s.

July 11.—Southport T.C. Installation of electric lighting and heating in 8 shops and 8 maisonnettes on Heathfield Rd. estate. Borough Architect, 91-105 Lord St. Deposit £1 1s.

July 13.—Bromley (Kent) T.C. Group A street lighting improvement scheme in four roads, involving re-erecting of existing columns and fixing 38 140 W sodium lanterns. Borough Engineer, Municipal Offices, Bromley, Kent. Deposit £2 2s. (See June 25 issue.)

July 13.—Cheshunt U.D.C. Dismantling of gas columns and supply and erection of 44 concrete columns with brackets, lanterns suitable for 250 W mercury lamps, and auxiliary gear, for street lighting in College Rd. Engineer and Surveyor, Manor House. Deposit £2.

July 13.—Chester T.C. Wiring of Christ Church and Boughton St. Pauls schools, and rewiring of City high school. City Engineer and Surveyor, Municipal Offices. (See June 25 issue.)

July 13.—Wallasey T.C. Electrical installation at Leasowe secondary and the Birket primary schools. Borough Architect, Town Hall. Deposit £1 1s. (See June 18 issue.)

July 13.—West Riding. Improvement to existing electrical installation at Todmorden Roomfield secondary school. Also renewal of electrical installation at Thorne Moorends boys' primary school and part renewal of same at Thorne Moorends girls' secondary school. County Architect, Bishopsgate, Westfield Rd., Wakefield. Deposit for second contract £2 2s. (See June 25 issue).

July 13.—Wigan T.C. Wiring installation in 100 dwellings on Worsley Mesnes estate. Borough Engineer, Municipal Buildings, Hewlett St. Deposit £1 1s.

July 16.—Newbiggin U.D.C. Electrical work in 30 dwellings on Spital estate. Surveyor, Council Offices.

July 17.—Londonderry. Electrical installation at Ballykelly primary school extension. J. R. W. Murland, consulting engineer, 13 Wellington Place, Belfast. Deposit £2 2s.

July 17.—Manchester. N.W. Div. of B.E.A. invite tenders for repairs to hyperbolic cooling

towers at Stuart St. power station. Divisional Secretary, 825 Wilmslow Rd., Manchester 20. Deposit £2 2s.

July 18.—Lanark. Supply of 22 lanterns, leak transformers and capacitors for 140 W sodium lighting along Lanark-Airdrie trunk road. Apply by above date to County Lighting Engineer, 15 Clydesdale Street, Hamilton.

July 18.—Prestwich T.C. Supply of equipment for conversion from tungsten filament to sodium vapour lighting along Heywood Rd. Borough Engineer, Town Hall.

July 18.—Whitefield (Lancs) U.D.C. Supply and erection of 73 Group A concrete columns with sodium lamps, lanterns and all auxiliaries, as well as dismantling existing equipment, along Manchester-Burnley (A.56) trunk road. Engineer and Surveyor, Town Hall. Deposit £2 2s.

July 20.—Barrowford (Lancs) U.D.C. Electrical work in erection of 18 houses on Higher Causeway estate. Engineer and Surveyor, Council Offices. Deposit £1 1s.

July 20.—Dover T.C. Supply and erection of 66 concrete columns and fixing only of H.P.M.V. units and auxiliary equipment, and complete wiring for Group A standard street lighting installation along Folkestone Rd. Borough Engineer, Brook House. Deposit £2 2s. (Advertised in this issue.)

July 20.—Dundee T.C. Supply of poles, brackets and lanterns for Group B street lighting, and a battery for Morrison electric tower wagon. Public Lighting Engineer, 46 Dens Rd.

July 20.—Leigh T.C. Installation of (a) 46 Class A mercury-vapour lighting points on 25 ft. concrete columns, and (b) 25 Class A mercury and five fluorescent tube lighting points on 25 ft. concrete columns. Borough Engineer and Surveyor, Town Hall.

July 20.—Southport T.C. Alteration and additions to electrical installation and lift at Fairholme, 8 Oxford Rd., Birkdale. Borough Architect, 93-105 Lord St. Deposit £1 1s.

July 21.—Dublin. Electrical heating in Valuation Office, Ely Place. J. Tyrrell, secretary, Office of Public Works. Deposit £1.

July 21.—Waterford. Supply and erection of pumps and electric motors suitable for 380 V, 3-phase a.c. supply for Tramore water supply scheme. Engineer, Council's Offices, Davitt's Quay, Dungarvan. Deposit £1 1s.

July 22.—Co. Tyrone. Electrical installation at Denamona primary school, Fintona. Chief Education Officer, Educ. Offices, Omagh. Deposit £3 3s.

July 23.—Durham T.C. Supply and erection of 34 250 W mercury street lights along Sutton St. and Crossgate St. City Engineer, Town Hall. (Advertised in this issue.)

July 24.—Dublin. Electric lighting, heating and other services at New Post Office, Monaghan. J. W. O'Neill, Engineer-in-Chief, Dept. of Posts and Telegraphs, The Castle.

July 24.—Heston and Isleworth T.C. Installation of Group A street lighting, including dismantling, erection of columns, lanterns and steel columns, and 400 W mercury lamps, along London - Bristol trunk road. Borough Engineer and Surveyor, 88 Lampton Rd., Hounslow. Deposit £2 2s. (Advertised in this issue.)

July 28.—Dundalk. Electrical installation at Fever Hospital. J. C. Costelloe, Consulting Engineer, 21 Lesson Park, Dublin. Deposit £10 10s.

July 29.—Ely (Camb) R.D.C. Electrical equipment for 6 bungalows in The Hithe, 29 houses in Woodfen Drove, and 6 bungalows in Victoria St. (all at Littleport), and 43 dwellings at Sutton and 6 houses at Thetford. Engineer and Surveyor Council Offices, 11 Lynn Rd.

July 31.—Belfast. Supply, erection, etc., of two 48-in bore motor-operated sluice valves, six motor-operated penstocks and other associated equipment at Belfast Municipal Power Station West. Tender form (No. N.1389) from Merz and McLellan, Consulting engineers, Carlisle House, Newcastle-on-Tyne. Deposit £5 5s. (Advertised in this issue.)

Aug. 1.—Ross and Cromarty. Installation of electric lighting and power in 22 houses on Isle of Lewis. Applications by above date to P. S. Leake, County Architect, The Old Academy, Dingwall.

Aug. 19.—Newcastle-on-Tyne. Lighting, power and impulse clock installations at Stocksfield Ave. school. R. W. Gregory and Partners, consulting engineers, Pilgrim House. Deposit £5 5s.

No date stated.—N. of Scotland H.-E. Board. Lighting, heating and auxiliary cabling installa-

Your Queries — Answered

"Hobut" ammeters, makers of? E.B.—Howard Butler Ltd., Crown Works, Lincoln Rd., Walsall. (23117)

"Castell" locks and keys, makers of? L.B.—J. H. Castell, 81 Gower St., W.C.1. (23119)

"P.H." torpedo switches, makers of? T.—These were made by P.H. British Electrical Works Ltd., for whom the sales agents are T. M. C. Harwell (Sales) Ltd., 37 Upper Berkeley St., W.1. (23121)

"Wagner" electric motors, agents for? H.—Refrigerator Components Ltd., 77 Great Peter St., S.E.1. (23125)

"Marmet" electric kettles, makers of? R.B.—These were made by Martins Metal Industries Ltd., formerly of Craven House, Kingsway, W.C.2, but we can no longer trace this firm. (23128)

"Jifextra" vacuum cleaners, makers of? L.—Water Softener and Vacuum Cleaner Service Ltd., 248 Romford Rd., Forest Gate, E.7. (23129)

"Autolite" motor brushes, makers of? R.B.—Autocar Electrical Equipment Co., Ltd., 32 Albert Embankment, S.E.1. (23130)

Cumberland and Hooker time switches, address of? A.W.—We presume inquirer refers to Chamberlain and Hookham Ltd., New Bartholomew St., Birmingham 5. (23133)

The above are selected from questions we have answered this week. If you have a query, send it to us.

tion at Errochty Dam intake and compensation turbine house. Merz and McLellan, 72a George St., Edinburgh. Deposit £2 2s.

No date stated.—N. of Scotland H.-E. Board. Installation of lighting, heating and auxiliary cabling at Errochty Dam Intake and Compensation Turbine House in Tummel Garry project. Merz and McLellan, 72a George St., Edinburgh. Deposit £2 2s.

OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

July 20.—Portuguese E. Africa. Supply of various electrical material and equipment, including distribution board, field rheostats, voltmeters, lamps, copper wire etc. for Directorate of Ports, Railways and Transport, Mozambique. B.o.T. (Ref: CRE 20745/53).*

July 27.—Portuguese E. Africa. Tenders (80/53) invited for supply of one 50 kVA generating unit complete with accessories for Mocuba power station. Ports, Railways and Transports Dept., Lourenco Marques. B.o.T. (Ref.: CRE 20746/53).*

Aug. 5.—U.S.A. Design, manufacturer etc. of two 4.16 kV generator neutral circuit-breaker units and four 15 kV outdoor current transformers for Chief Joseph Dam project. Invitation No. CIVENG-45-108-53-82. Corps of Engrs., U.S. Army Office of District Engr., Seattle District, 4735 Marginal Way, Seattle, Washington. B.o.T. (Ref: CRE 21769/53).*

Aug. 7.—New Zealand. Post and Telegraph Dept. requires supply of insulation testers, microammeters, multi-range meters and voltmeters under tender P. and T. 150/6244. Director-General (Stores Div.), G.P.O., Wellington. B.o.T. (Ref.: CRE 21535/53)*

Aug. 11.—Uruguay. Supply of transformers to various specifications and spares for Usinas Electricas y Telefonos del Estado. This is third request for tenders. B.o.T. (Ref.: CRE 30813/53).*

No date stated.—Colombia. Electrical equipment required for sub-stations and transmission line from Medellin to La Handa pumping station, for second section of Empresas Municipales of Medellin. Details from Ingeniero Jefe Departamento Tecnico, Apartardo Aereo 621, Medellin. B.o.T. (Ref.: CRE 2557/52).*

PRICE OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	252 0 0	—
LEAD, good soft pig (foreign)	90½-91	108 0 0
TIN (99·99·76%) (Cash)	662½-665	—
(3 months)	657-660	—
ALUMINIUM, commercial purity (del.)	150 (from July 1)	—
ZINC	72-72½	88 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.)	51 10 0	—
Mild Steel Tape (C·34 in.)	40 0 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Beam (Electronic Engineers) Ltd. Last day for receiving proofs in respect of intended dividends is July 11. Liquidator is J. M. Clarke, Sr. Official Receiver, Inveresk House, 346 Strand, W.C.2.

Dryall Ltd. Meetings of creditors and contributories will take place at Inveresk House (Room 401), 346 Strand, W.C.2, today (Thurs.) at 10.15 a.m. and 10.45 a.m. resp.

P. L. Dwyer and Co., Ltd. Meetings of creditors and contributories will be held tomorrow (Fri.), at Inveresk House (Room 401), Strand, W.C.2, at 10.15 a.m. and 10.45 a.m. resp.

CONTRACTS PLACED

Birmingham. Electrical installation at Victoria St. school of art, W. J. Sheath; same at Whitehead Rd., Aston. Partially Sighted school, Baxter and Impey Ltd.; also at City Rd., Edgbaston, school, National Electric and Engineering Co. (Birmingham) Ltd.; and at Ickneid St., Hockley, secondary school, Harris and Sheldon, Ltd.

London. Electrical installation at Lyndhurst Grove primary school, £3,022, and Telferseat primary and secondary schools, £3,299, Electrical Contracting Co.; same at Meridian primary school, £3,082, Johnson Smith and Co., Ltd.; and same at Elmfield secondary school, £3,249, D. C. Engineering Co. Ltd.

London. Installation of electric lighting in Viaduct Buildings, Saffron Hill. Haines and Sheppard Ltd., £1,399.

Ryton-on-Tyne U.D.C. Electrical installation in 44 houses at Greenside, Storey and Crowe.

Shotley Bridge (Dur) Electrical installation at Shotley Bridge Hospital, Cairns Ltd., £3,254.

Silver-Tone Lighting and Radio, Ltd. Meeting of creditors has been arranged for July 8 at Hall 43, Winchester House, Old Broad St., E.C.2, at 2.30 p.m.

Ward and Co. (Dewsbury) Ltd. Resolution for voluntary winding-up passed at meeting on June 17 when Clifford Sykes, 11 Bond St., Dewsbury, was appointed liquidator. Creditors are asked to send particulars to him by July 15.

BANKRUPTCY ACTS

First Meeting

Chester. Frederick E. L. Hester, electrical contractor trading at 9 Coal Exchange, Black Diamond St., Chester. Meeting takes place today (Thurs.) at Official Receiver's Office, W. Africa House, 25 Water St., Liverpool, at 11 a.m. Public examination will be at The Castle, Chester at 10.15 a.m. on July 23.

Release of Trustee

Wandsworth. Richard Kendall, electrical dealer, of 66 Sheen Rd., Richmond. Trustee was C. T. Newman, Official Receiver, 3 Central Buildings, Matthew Parker St., Westminster.

Intended Dividends

Haverfordwest. William Pickersgill, motor and electrical engineer trading at The Garage, Clarbeston Rd., Haverfordwest. Last day for receiving proofs, July 10. Trustee is R. Belts, Official Receiver, Govt. Buildings, 10 St. Mary's Sq., Swansea.

Dividends

Brentford. Basil F. Robbings trading as Electric House at 1388 Greenford Rd., Greenford Green, Middlx., and as Radio and Electric House at 810 Northolt Rd., S. Harrow. First and final dividends of 2s. 4·31d. in £ payable at Official Receiver's Office, 58-61 York Terrace, Regent's Park, N.W.1, on July 13.

BUSINESS PROSPECTS

HOME

Aldridge (Staffs) U.D.C. Construction of 76 houses at Pelsall Wood. C. E. Andreason, Engineer and Surveyor, Council Offices, Rushall, Walsall.

Bedford T.C. C. Sweett, Bedford Row, London, will probably be quantity surveyors for erection of 159 houses off Church Lane.

Bristol T.C. Alterations and additions in conversion of part of Muller's Orphan Homes into Technical College. Chief Education Officer, The Council House, College Green.

Brighton T.C. Erection of 186 houses on Woodingdean estate. Borough Engineer and Surveyor, 26-30 King's Road.

Bury. Henry Hargreaves and Sons, Ltd., are planning to extend premises in Cook St.

Bracknell. Additions to premises at new town costing £13,000 being planned by E. A. Ferriby, Farley Hill, Binfield, for Fluidrive Engineering Co., Ltd. Also, W. H. Scanlan, 56 Buckingham Gate, London, is architect for factory proposed by Kent Bros.

Darlington T.C. First instalment of new College of Further Education to cost about £63,750 has been included in next year's building programme.

Diss (Norfolk) U.D.C. Construction of 48 houses in district. A. E. Scott and Sons, Architects, 23 Tombland, Norwich.

Doncaster T.C. Erection of 104 and 93 dwellings under two contracts. Borough Architect's Office, 15 South Parade.

Dorchester T.C. Tenders to be invited shortly for erection of 120 houses and 12 bungalows on Poundbury site.

Durham. A £1,300 scheme being considered for installation of electric lighting at Bishop Auckland St. Anne's C.E. school.

East Riding. Alterations and extensions at school premises in West St., Bridlington, to form a technical institute. County Architect, County Hall, Beverley.

Felling (Dur.). Montague Burton, Ltd., Hudson Rd. Mills, Leeds, are to convert premises in High St. into shop and seven offices.

Fife. Approval given to erection of primary schools at Fair Isle Rd., Kirkcaldy, and Aberdour Rd., Dunfermline. Cost estimated at £128,000.

Great Yarmouth T.C. Erection of 72 flats and maisonnettes in Middlegate St. area. Borough Engineer, 8a Queen Street.

Hornchurch U.D.C. Erection of 48 houses at Cranham in three groups. Surveyor, Council Offices.

Hull. Thornton-Varley, Ltd. propose to rebuild premises in Prospect St. at cost of £300,000. Architects are J. W. Beaumont and Sons, 53 Spring Gardens, Manchester.

Leicester T.C. Approval received for construction of 488 houses.

Lichfield T.C. Erection of 72 dwellings on Wheel Lane estate. L. Straw, city engineer and surveyor, Guildhall.

Mansfield. Plans approved for factory extensions in Nottingham Rd. for Field Upholstery Co. Also additions in Bottany Ave. proposed by Mansfield Hosiery Mills, Ltd.

Middlesbrough. Extensions proposed to factory BT28/4 on North-Eastern Trading Estate. Architects are Matkin and Hawkins, Barclays Bank Chambers, Fawcett St., Sunderland.

Newcastle-on-Tyne. Factory additions proposed at Cremona Toffee works to plans by C. S. Errington, 46 Grainge St. Also, plans approved in principle by T.C. for five-storey blocks of flats in Elswick Street.

South Shields. Factory additions proposed on Bede trading estate for B.W.B. Cakes, Ltd., to plans by Cackett, Burns, Dick and MacKeller, 21 Ellison Place, Newcastle.

Southampton. Burts and Harvey Ltd. propose to build factory in Bursledon Rd. Plans by C. A. Sheppard, 28 Union St., Ryde, I.o.W.

Tynemouth T.C. Tenders may soon be invited for overhaul and repair of electrical installation at 4 Northumberland Square, North Shields. Also working drawings and quantities to be prepared for proposed Monkhouse primary school, and tenders will probably be sought at end of year.

OVERSEAS

Mexico. Almex S.A., San Juan de Letran 21—808-809, Mexico, D.F., are enquiring on behalf of their affiliated company Aramis S.A., who wish to represent U.K. makers of heavy thermo-electrical and hydro-electrical equipment. Communications should be sent direct to Aramis S.A. at above address.

U.S.A. Inquiries are being made by Cummings-Moore Graphite Co., 1646 Green Ave., Detroit 9, Michigan, regarding purchase from U.K. of diesel electric power plant to generate 200 kW, an electric air compressor and electrically driven mine hoist. All literature should be sent in duplicate.

TRADE NOTES

Agent. Ega Electric Ltd. have appointed Mr. J. Wood, of Glenan Gardens, Helensburgh, Dunbartonshire, as their agent for the whole of Scotland.

Changes of Address. The sales office of Sunvic Controls Ltd., previously at 132-5 Long Acre, W.C.2, has been transferred to No. 1 Factory, Eastern Industrial Estate, Harlow New Town, Essex. Telephone Harlow 2031.

The London address of British Die Casting Co., Ltd., is now Edward Rd., New Barnet, Herts. Telephone: Barnet 9211.

New Offices. Ensel Electric Co., Ltd., have opened new London offices, showrooms and trade counter at 218 Upper St., N.1. Telephone Canonbury 2251-2.

Distributors. Hercules Powder Co., Ltd., 140 Park Lane, W.1, have concluded an agreement to act as sole distributors for the U.K. of Akulon, a polyamide type injection and extrusion moulding material made in Holland.

Expansion. Midland Silicones Ltd. state that their associates in the U.S.A., the Dow Corning Corporation, have added extensively to their silicone rubber plant in Midland, Michigan. This plant is now the largest of its kind in the world, with current production running at 500,000 pounds per month. British production of silicone rubber by Albright and Wilson Ltd., also an associate of Midland Silicones Ltd., started in the autumn of 1952.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London, W.C.2.

Richard Chick Ltd., 47 Wilton Way, E.8. Designers, manufacturers of and dealers in wooden and metal electric light fittings, etc. Cap.: £500. Dirs.: A. R. G. Chick and Catherine P. Chick.

H.P. Finance Co. (Cheshire) Ltd., Barons Quay, Northwich, Ches. Merchants of and dealers in cooking and heating appliances, etc. Cap.: £1,000. Dirs.: T. R. G. Moore and J. A. I. Knight.

T. E. Gibbs (Wholesalers) Ltd., Westcroft, Pinhoe, Exeter. To take over business of electrical wholesaler carried on at Pinhoe, Exeter as "T. E. Gibbs." Cap.: £500. Dirs.: T. E. Gibbs and Mrs. V. Gibbs.

Minifon (Great Britain) Ltd., 19 Gt. Winchester St., E.C.2. Manufacturers of and dealers in electronic and electro-mechanical equipment and sound recording and communications developments; to manufacture and distribute the Minifon Electronic Magnetic Recording and Reproducing Machines and allied products, etc. Cap.: £1,000. Dirs.: S. J. Allen and G. Trevor-Johnstone.

O. and M. Industries, Ltd., Wadebridge, Cornwall. Mechanical, electrical, marine, aeronautical and gas engineers, etc. Cap.: £20,000. Dirs.: E. B. Shaw and L. G. Tom.

Newark Electrical Co. Ltd., 16 Appleton Gate, Newark, Notts. Electrical engineers, etc. Cap.: £1,000. Dirs.: C. E. Squires and R. H. Lamb.

J. Smith and Son (Swansea) Ltd., 81 The Kingsway, Swansea. Electrical, mechanical and general engineers, etc. Cap.: £8,000. Dirs.: J. Smith, J. R. Smith and Mrs. M. E. Smith.

A. Thompson and Son (Chorley Wood) Ltd., 12 Solesbridge Lane, Chorley Wood, Herts. Electricians, electrical and wiring contractors, etc. Cap.: £100. Dirs.: Dorothy C. Thompson and L. W. Troak.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

D in design. 712,468. Class 9. Audible and visual staff locating and calling apparatus, amplifiers, time recorders, signalling and alarm apparatus. Dictograph Telephones Ltd., Aurelia Road, Croydon, Surrey.

Cactus. 717,116. Class 9. Electric connectors. United Insulator Co., Ltd., Oakcroft Rd., Tolworth, Surbiton.

MEETINGS TO NOTE

TUESDAY, SEPT. 15

A.P.L.E. Annual Conference and Exhibition at Liverpool continues until Sept. 18.

THURSDAY, SEPT. 24

I.E.E. Section summer visit to Porthcawl, Sept. 24 to 27.

EXHIBITION DIARY

Brit. Instrument Industries Show opened at Olympia on June 30 and closes on July 11.

Royal Show. Being held this year at Stanley Park, Blackpool, from July 7 to 10.

Gt. Yorkshire Agric. Show. Opens at Harrogate on July 14.

LONDON ELECTRIC WIRE COMPANY & SMITHS

Record Consolidated Profits

THE forty-fourth annual general meeting of The London Electric Wire Company and Smiths Ltd. was held on June 24 in London.

Mr. A. Noel Smith presided in the absence through indisposition of the chairman and managing director, Mr. W. J. Terry, and read his speech from which the following is an extract:—

The Consolidated Profits for the year, at £1,307,110, are £89,891 higher than for the previous year and constitute a record for the group. Although there was an increase in earnings, the resultant profit of £510,580, after providing for taxation—including Excess Profits Levy which appears for the first time—is lower by £29,241 than in the previous year. Taxation, therefore, absorbs 61% of the Profits, or the equivalent of 12s. 2d. in the £. The trading results for 1952 fully support the recommendation of a distribution of 15%, described as "10% Dividend plus a Coronation Bonus of 5%."

For the year under report, our Home Sales were greater than in the previous year, both in volume and value, the value of course being influenced by the high price of Copper. Our Direct Export Sales were somewhat lower than in 1951. The electrical industry has, however, a vast Export business of which our products are an integral part, the extent of which cannot be determined.

Monopolies Commission

Since our last meeting, the Monopolies and Restrictive Practices Commission have published their report on their Inquiry into our industry and it is very difficult to believe that some of their recommendations are necessary in the public interest. If the Commission's recommendations are insisted upon, it will imperil the existence of trade associations which have done so much to build up British industry and were essential in providing during the war a channel of communication between the Government and the various industries manufacturing vital equipment. They are equally essential in existing circumstances to encourage a common effort, ensure general progress and provide the necessary co-operation with Trade Unions.

Once again it is very difficult to forecast the future. This country's economy is mainly based on demands for Defence requirements and any rapid reduction in these demands, however desirable, would bring dislocation in our trading conditions. It is to be hoped that a new progressive programme will be ready for immediate application should such circumstances arise.

Now that there is a measure of relief from Government control our necessary capital commitments for extensions and new plant for both home and abroad are approaching £800,000. Our financial results are greatly influenced by the load on the factories. A heavy load means satisfactory profits, whereas during a period of restricted trading our results are more than proportionately affected by reduced turnovers.

Our liquid resources will be required and should be adequate to finance larger Copper stocks and the extensions already mentioned. I feel that the future can be faced with confidence.

The report and accounts were adopted.

THERE'S ALWAYS ROOM FOR A HENLEY DWARF

LOOK AT IT THIS WAY-

that's pretty good eh! just nine inches from back to front

And see how snugly it fits against that wall! You'll never have any bother finding room for a Henley Dwarf Pillar. If you want to you can build it into the wall and it will still be just as accessible.

If you are not familiar with

HENLEY

DWARF

TYPE

DISTRIBUTION PILLARS

write for Catalogue 22/1.

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD.
51–53, HATTON GARDEN, LONDON, E.C.1

HOW MANY HOURS HAS YOUR EQUIPMENT BEEN OPERATING?

The Sangamo Model S.16. Hour-meter, with cyclometer type dial.

The Sangamo Model S.16 Hour-meter registers with infallible accuracy the number of hours during which an electrical circuit has been functioning. It is of the synchronous motor driven type, for use on controlled frequency supply. Normally supplied for 200/250v. 50 cycle mains, it can be ordered with cyclometer or pointer type dial and registers every 1/10th hour up to a total of 9,999·9 hours or, alternatively, every hour up to a total of 99,999 hours. The model S.16 is widely applied by *users* of important equipment to indicate that the time for a period overhaul has been reached—or by *suppliers* of such equipment to check the user's estimate of the number of hours which the plant will be in operation. Diameter 4½". Depth 3⅜". Further details gladly supplied on request. Retail price in U.K. £5.3.3.

SANGAMO WESTON LIMITED

ENFIELD : MIDDLESEX

Tel: Enfield 3434 (6 Lines) & 1242 (4 lines) Grams: Sanwest, Enfield

Scottish Factory: Port Glasgow, Renfrewshire. Port Glasgow 4115

Branches: London, CHAncery 4971 Glasgow, Central 6208 Manchester, Central 7904 Newcastle-on-Tyne, Newcastle 26867 Leeds, Leeds 30867 Liverpool, Central 0230 Wolverhampton, Wolverhampton 21912 Nottingham, Nottingham 42403 Bristol, Bristol 21781 Southampton, Soton 3328 Brighton, Brighton 28497

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WORK WANTED WANTED · FOR SALE

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

CITY OF BELFAST

VALVES AND PENSTOCKS

TENDERS are invited for the supply, delivery and erection at the extension to Belfast Municipal Electric Power Station West of two 48-in. bore motor-operated sluice valves, associated pipework and fittings, and six motor-operated penstocks with "Everdur" facings, of approximately 50 sq ft area each. The penstocks will require to be designed to line up with those existing.

Form of tender (No. N.1389), conditions, specification and drawings, in quintuplicate, may be obtained from Messrs. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-upon-Tyne 1, on payment of a deposit of five guineas, which will be refunded provided a bona fide tender is lodged and not withdrawn. Extra copies of the contract documents may be obtained at one guinea per set; this sum will not be returnable. Cheques should be made payable to the Belfast Corporation Electricity Department.

Each tender, in quadruplicate, in sealed envelope marked "Tender for L.P. valves and penstocks, Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, July 31, 1953.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast.
June 26, 1953. (E 263)

BOROUGH OF DOVER

TRUNK ROAD LIGHTING

Folkestone Road A.256

TENDERS are invited for the installation of a lighting scheme to Group A standard. The works include the supply and erection of 66 reinforced concrete columns, the fixing only of H.P.M.V. units and auxiliary equipment, and complete wiring.

Specification and form of tender may be obtained from the Borough Engineer, Brook House, Dover, upon payment of a deposit of two guineas, returnable on receipt of a bona fide tender not subsequently withdrawn.

Plans and general conditions of contract may be seen at the office of the Borough Engineer.

Sealed tenders, in envelopes provided, must be delivered to the undersigned not later than July 20, 1953.

JAMES A. JOHNSON,
Town Clerk.

New Bridge House,
Dover.
June 29, 1953. (E 262)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

TUMMEL GARRY PROJECT

Lighting, Heating and Auxiliary Cabling Installation at Errochty Dam Intake and Compensation Turbine House.

TENDERS are invited for the above installation. Copies of the Tender Documents may be obtained on application, with cheque for two guineas (returnable), to the Engineers, Messrs. Merz and McLellan, 72a George Street, Edinburgh.

The Board do not bind themselves to accept the lowest or any tender.

W. D. D. FENTON,
Secretary.

16 Rothesay Terrace,
Edinburgh 3. (E 244)

CITY OF DURHAM

Sutton Street—Crossgate Peth Lighting

MERCURY DISCHARGE UNITS

THE Council invites tenders for the supply and erection of thirty-four 250-watt mercury discharge street lighting units. Full details and Form of Tender may be obtained on application to the City Engineer, Town Hall, Durham. The date by which tenders are to be submitted to me is July 23, 1953.

D. B. MARTIN-JONES,
Town Clerk.

32 Claypath, Durham.
June 23, 1953. (E 245)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT OF GENERAL ASSISTANT ENGINEER

Design and Planning Section, Sub-Area Technical Engineer's Dept., Manchester

APPLICANTS should have received technical education to Higher National Certificate level and preferably be Corporate Members of the Institution of Electrical Engineers.

Duties require a knowledge of the engineering problems in large industrial city networks. Candidates should be familiar with h.v. switchgear, protective systems and metering equipments, and be able to conduct technical correspondence.

Salary scale, £861 to £981 p.a. Grade "M.13" N.J.B. conditions.

Applications to Sub-Area Secretary, No. 1 Sub-Area, The North Western Electricity Board, Town Hall Extension, Manchester 2, P.O. Box 493, not later than Saturday, July 11, 1953.

APPOINTMENT OF GENERAL ASSISTANT DISTRICT CONSUMERS' ENGINEER

Whitehaven District

Applicants must have a good knowledge of estimating and supervising contract work for commercial, industrial and street lighting schemes. Experience in agriculture would be an added advantage. Higher National Certificate standard of education desirable.

Salary scale, £486 to £486 p.a. Grade "F.13." N.J.B. conditions.

Applications to Sub-Area Manager, No. 6 Sub-Area, The North Western Electricity Board, Castle Green, Kendal, by July 11, 1953. (E 253)

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT (WAYLEAVES) (N.J.C.)

Sevenoaks and Horley District

SALARY, £460 by £20 to £520 p.a. Grade 2. Superannuable. Applicants should be experienced in negotiating wayleaves and able to deal with correspondence and preparation of applications for planning and ministerial consents.

Applications, giving two referees, on forms obtainable from H. F. Gill, District Manager, SEEBoard, Electric House, West Hill, Oxted, to be returned to him by July 15, 1953.

A. L. BURNELL,
Secretary.

June 26, 1953. (E 269)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:—

CIVIL ENGINEERING DRAUGHTSMEN
Construction Department
Vacancy No. 22/53

Candidates should have experience in design and detail of reinforced concrete structures, piled and slab foundations for heavy plant, culverts, cable subways, etc., for general building construction drainage and sanitation schemes, associated with office and administrative buildings.

The salary will be in accordance with Grade 5 (£567-£671 per annum), or Grade 6 (£433-£567 per annum) of Schedule "D" of the National Joint Board Agreement.

ENGINEERING DRAUGHTSMEN (MECHANICAL)
Construction Department
Vacancy No. 44/53

Senior draughtsmen are required in the mechanical section of the construction department at North Wilford Power Station. Candidates should have experience in one or more of the following:—

(i) Design and layout of power station equipment, including turbo-alternators, boiler plant, coal and ash plant, and general station auxiliaries.
(ii) H.P. and L.P. steam and feed pipework. Condensing plant and feed heating systems.
(iii) Conveyor plant, coal-handling systems and material handling of station auxiliary equipment.

Salary and conditions of service will be in accordance with the National Joint Board Agreement, Grade 5 (£567-£671 per annum), and Grade 6 (£433-£567 per annum), of Schedule "D," according to experience.

JUNIOR ENGINEER
Hinckley Power Station
Vacancy No. 58/53

Candidates should have gained an Ordinary Certificate in electrical engineering and have had experience in a power station.

The salary will be in accordance with Schedule "A," Class "B," Grade 13 (£390 per annum), progressing to Class "B," Grade 12 (£404-£423 per annum) of the National Joint Board Agreement.

Closing date for this appointment will be July 6, 1953.

ENGINEERING DRAUGHTSMEN (ELECTRICAL)
Construction Department
Vacancy No. 61/53

Candidates should have experience in the preparation of layouts and diagrams for the installation of E.H.T. and L.T. switchgear, transformers, E.H.T. and L.T. cables; knowledge of protective gear systems would be an advantage.

The salary will be in accordance with Grade 5 (£567-£671 per annum) or Grade 6 (£433-£567 per annum) of Schedule "D" of the National Joint Board Agreement.

MAINTENANCE ENGINEER (ELECTRICAL)
Freemen's Meadow Power Station, Leicester
Vacancy No. 66/53

Applicants should have a sound knowledge of modern power station equipment, including air-blast switchgear, large alternators, and P.F. auxiliaries. Corporate Membership of the Institution of Electrical Engineers is desirable.

Conditions of service and salary in accordance with the N.J.B. Schedule "A," Class "H," Grade 6 (£833-£866 per annum).

Closing date for this appointment will be July 7, 1953.

DEPUTY POWER STATION SUPERINTENDENT
Derby Power Station
Vacancy No. 67/53

Applicants should preferably be Corporate Members of the Institution of Electrical Engineers and/or the Institution of Mechanical Engineers, and experience of pulverised fuel firing will be an advantage.

A wide knowledge of the operation and maintenance of a modern generating station and sound administrative ability are essential.

The salary will be in accordance with Class "F," Grade 3 (£912-£951 per annum) of the National Joint Board Schedule.

Closing date for this appointment will be July 7, 1953.

GENERAL ASSISTANT ENGINEER
Technical Department, Divisional Headquarters
Vacancy No. 49/53

The minimum technical qualification required is the Higher National Certificate in electrical engineering. Preference will be given to candidates who have completed a recognised post-graduate apprenticeship and experience of high-voltage switchgear and protective gear will be an advantage.

The successful candidate will be required to reside at or near Nottingham or Leicester.

The salary will be in accordance with Schedule "C," Class AX/DX, Grade 8 (£501-£694 per annum) of the National Joint Board Agreement. The commencing salary will depend on qualifications and experience.

(*Continued in next column*)

(*Continued from previous column*)

Closing date for this appointment will be July 6, 1953.

The above appointments will be pensionable within the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned to the undersigned by the dates stated. Please quote Vacancy No.

L. F. JEFFREY,
Divisional Controller.
(E 271)

BRITISH ELECTRICITY AUTHORITY

South Western Division

TECHNICAL STAFF VACANCIES

(a) ASSISTANT SHIFT CHARGE ENGINEER—Plymouth "A" Generating Station. N.J.B. Class "G," Grade 9, £641 to £667.

(b) ASSISTANT ENGINEER (Technical Records)—Plymouth "B" Generating Station. N.J.B. Class "F," Grade 13, £466 to £486.

Superannuation scheme.

For (a) applicants should have good technical qualifications, and a knowledge of the operation and maintenance of generating plant.

For (b) applicants should have had sound general and technical education. Preference will be given to those possessing Ordinary or Higher National Certificate.

Applications on Form A.E.6/ACT, obtainable from the Divisional Secretary, 26 Oakfield Road, Bristol 8, should be completed and returned by July 13, 1953. (E 259)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

Chilterns Sub-Area

Hemel Hempstead District

THIRD ASSISTANT ENGINEER 35/53.N.

Candidates should have had a sound training in electrical engineering and experience of the construction, operation and maintenance of l.v. and h.v. underground and overhead systems including substations.

The salary will be in accordance with Class "E", Grade 9, of the National Joint Board Salary Agreement, commencing at £587 p.a.

Apply to the District Manager, Hemel Hempstead, Eastern Electricity Board, Marlowes, Hemel Hempstead, Herts.

Northmet Sub-Area Headquarters

London, N.14.

JUNIOR ENGINEER 47/53.R.

Candidates should have had a sound technical training to Higher National Certificate standard or equivalent and should preferably have had previous experience in the electricity supply industry. The duties will be of a general nature on operation and maintenance, planning and development, or construction, with opportunities for temporary secondment to district staff as required.

The salary will be in accordance with Class "N", Grades 22 to 18, of the National Joint Board Salary Agreement within a range of £427 to £571 p.a., inclusive of London Allowance, commencing at a point dependent upon the candidates' qualifications and experience.

Apply to the Manager, Northmet Sub-Area, Eastern Electricity Board, Northmet House, Southgate, London, N.14.

Future salaries and conditions of service for the above appointments will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications by letter, stating age, education, qualifications and experience with details of present appointment and salary, should be submitted to the Manager concerned within 14 days of the appearance of this advertisement. (E 265)

TECHNICIAN (CARRIER AND RADIO)

REQUIRED for NORTHERN RHODESIA GOVERNMENT Posts and Telegraphs Department for tour of three years in first instance with prospect of permanency. Salary, etc., in scale £851, rising to £1,103 a year. Free passages. Liberal leave on full salary. Candidates should possess C and G certs. in telecoms., and have had considerable experience of installation and maintenance of (a) v.h.f. radio links and general h.f. radio equipment; (b) multi-channel carrier telephone and telegraph systems. They should also have good working knowledge of auto-change systems.

Write to the Crown Agents, 4 Millbank, London, S.W.1, State age, name in block letters, full qualifications and experience and quote M2C/33600—EE. (E 267)

NEW ZEALAND MINISTRY OF WORKS

BUILDING SERVICES DRAUGHTSMEN

SALARY up to £860 as merited. Locations: Head Office, Wellington, Hamilton, Wanganui and Dunedin.

Applicants must have had draughting and design experience in heating and ventilating or general building services engineering (mechanical, electrical and drainage) for hospitals, schools, offices and public buildings; to include boiler and engine plant, heating systems, steam reticulation, electrical distribution, ventilation and air conditioning, lifts and elevators, and general building drainage.

Applicants may later be required to submit at interview recent examples of their drawings and calculations.

BUILDING SERVICES ENGINEER

Salary up to £1,180, according to experience. Location: Head Office, Wellington.

Applicants should hold a university degree in engineering and/or be a Corporate Member of the Institution of Mechanical Engineers, Corporate Membership of the Institution of Electrical Engineers or Associate Member of the Institute of Heating and Ventilating Engineers would be considered as desirable additional qualifications.

Candidates should have served a recognised training period within engineering industry and should have had extensive experience in design, installation and supervision of boiler and engine plant, hot water and other heating systems, steam reticulation and utilisation, ventilation, air conditioning and refrigeration, lifts and elevator and general engineering services.

Applicants with maximum experience will be considered for the position of Assistant Chief Building Services Engineer at or about the maximum salary advertised, and will be called upon for inspections and reports on installations in hospitals, public buildings and defence services establishments. Age of applicants should preferably be between 35 and 45 years.

Further particulars and application forms can be obtained from the Office of the High Commissioner for New Zealand, 415 Strand, London W.C.2, quoting reference A/B 3/74/85 and the name of this paper. Completed application forms must be lodged at the above office not later than Friday, August 7, 1953. (E 264)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

FIRST ASSISTANT STATION CHEMIST is required at Meaford Generating Station. N.J.B. service conditions, superannuable appointment, salary within Schedule "A", Grade G9, commencing at £641 p.a.

Candidates should have had laboratory experience, preferably in a modern power station, covering the analysis of fuel, water and oil, and should be conversant with water treatment and fuel sampling. Applicants should preferably possess a university degree or A.R.I.C., but those with Higher National Certificate in Chemistry will receive consideration.

Apply on forms available from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13 or on Form AE6, by July 25, 1953. (E 272)

SOUTHERN ELECTRICITY BOARD

BRANCH COMMERCIAL SUPERINTENDENT

PETWORTH BRANCH, Aldershot District of No. 3 (Portsmouth) Sub-Area. Salary N.J.B. Class "F", Grade 9 (£607-£629 per annum). N.J.B. conditions of service.

Applicants should be qualified to accept responsibility within the branch for all matters coming under the District Commercial Officer including development, installations and the application of tariffs. The possession of suitable technical qualifications would be an advantage.

The successful candidate will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him in envelopes suitably endorsed, not later than July 17, 1953. (E 266)

STATION ENGINEER

ELECTRICITY Department, required for the GOLD COAST Local Civil Service for two tours of 18-24 months in the first instance. Salary, etc., in consolidated scale £990 rising to £1,230 a year. Gratuity at the rate of up to £150 a year. Outfit allowance £60. Free passages. Liberal leave on full salary. Candidates must have served an electrical or mechanical engineering apprenticeship and have had practical experience of the construction and maintenance of overhead line distributions systems for h.t. and l.t. supply and the maintenance of electrical power plant.

Write to the Crown Agents, 4 Millbank, London S.W.1. State age, name in block letters, full qualifications and experience and quote M2C/29137/EE. (E 280)

CENTRAL ELECTRICITY BOARD FEDERATION OF MALAYA

ELECTRICAL ENGINEER (DISTRIBUTION) (M2C/29433/EE), ASSISTANT POWER STATION SUPERINTENDENT (M2C/26769/EE) and OPERATION AND EFFICIENCY ENGINEER (M2C/26770/EE) required by the Central Electricity Board, Federation of Malaya. Option of appointment either: (a) on agreement for three years with prospect of permanency, or (b) on contract for three years with gratuity of £200 or £280 for each year's service according to salary. Allowances additional to those mentioned below and ranging between £210 and £630 a year, payable to married men according to salary and dependants. Free passages. Liberal leave on full salary. Opportunity of terminating appointment at the end of one year if so desired.

ELECTRICAL ENGINEER (DISTRIBUTION). Salary (etc.) equivalent to £1,218, rising to £2,100 a year. Candidates must have had sound training in both electrical and mechanical engineering with experience in the operation of medium electricity supply undertakings and possess a competent knowledge of the maintenance of high and low tension overhead and underground a.c. distribution systems and substation plant. They should preferably be Corporate Members or Graduates of the Institution of Electrical Engineers or possess degrees or other qualifications carrying exemption from the Institute's Graduate examination. Those not so qualified would be eligible for salary in scale £1,197, rising to £1,862 a year.

ASSISTANT POWER STATION SUPERINTENDENT. Salary (etc.) equivalent to £1,904, rising to £2,100 a year. Candidates must have wide experience of station maintenance and operation and preferably have held a similar position in a steam power station of not less than 30 MW capacity or as a charge engineer for at least five years on a station of not less than 120 MW capacity.

OPERATION AND EFFICIENCY ENGINEER. Salary (etc.) equivalent to £1,667, rising to £2,100 a year. Candidates must have had good power station experience including some years as a charge engineer in a modern steam station, and have a knowledge of the principles of combustion, thermal cycles and heat balances, system control, and the economics of operation. Candidates should preferably be Corporate Members or Graduates of the Institutions of Electrical or Mechanical Engineers or hold an equivalent qualification. Those not so qualified would be eligible for salary in scale £1,673, rising to £1,862 a year.

Write to the Crown Agents, 4 Millbank, London, S.W.1, State age, name in block letters, full qualifications and experience and quote reference number against appointment for which application is made. (E 270)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments which are superannuable and subject to medical examination.

No. 2 Sub-Area

JUNIOR ENGINEER required on the Sub-Area Headquarters staff, Sandiway, near Northwich, but for the time being to be based at Warrington District. Salary within the range £402 to £545 per annum (N.J.B. Class "K," Grade 19/15).

Applicants should preferably have attained the standard of the Higher National Certificate in Electrical Engineering and practical experience in the testing of protective systems will be an advantage.

Standard application forms obtainable from the Manager, No. 2 Sub Area, Electricity House, Sandiway, near Northwich. Closing date July 13, 1953.

No. 4/5 Sub-Area

GENERAL ASSISTANT ENGINEER required in the Technical Section based on Legacy, near Wrexham. Salary £552 to £573 per annum (N.J.B. Class "J," Grade 13).

Applicants should possess the necessary qualifications to enable them to become Chartered Electrical Engineers and have experience in the commissioning and maintenance of protective gear and the testing of electrical plant.

Standard application forms obtainable from the Manager, No. 4/5 Sub-Area, Electricity House, Rhostyllen, near Wrexham. Closing date July 13, 1953. (E 254)

ASSISTANT MECHANICAL MAINTENANCE ENGINEER required for organisation in East London district operating large electrical station. Applicants should have wide and up-to-date experience in the maintenance of modern generating station power plant and be capable of supervising turbine and boiler overhauls. Technical qualifications should be sound. Age not less than 32 or over 45. Commencing salary £860 per annum, with non-contributory pension. Position has excellent prospects.—Reply to Box No. 2727, Electrical Times, quoting Ref. TME/6. (E 194)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

Vacancy No. 51/53

APPLICATIONS invited for the following superannuable N.J.B. appointments:—

1. ASSISTANT SHIFT CHARGE ENGINEERS, Carmarthen Bay Power Station, Burry Port. Salary K.9 (£766 to £796 p.a.).

H.N.C. and regular apprenticeship desirable. Operating experience in a modern generating station essential.

2. STATION SHIFT CONTROL ENGINEER, Uskmouth Power Station. Salary K.10 (£719 to £750 p.a.).

H.N.C. and experience in control room of modern power station required.

Application forms obtainable from Secretary, South Wales Division, British Electricity Authority, Twyn-y-Fedwen Road, Gabalfa, Cardiff, should be returned by July 14, 1953. (E 258)

TECHNICIAN (CABLE WORK)

REQUIRED for NORTHERN RHODESIA GOVERNMENT Posts and Telegraphs Department for tour of three years in first instance with prospect of permanency. Salary, etc., in scale £651 rising to £1,103 a year. Free passages. Liberal leave on full salary. Candidates should possess C and G certs. in telecoms., and have had considerable experience of installation jointing and plumbing of all types of cables. They should also have had field experience of loading and balancing audio and carrier trunk cables, and have a working knowledge of subscribers apparatus installations and distribution systems.

Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quote M2C/33603/EE. (E 268)

ASSISTANT ELECTRICAL ENGINEER wanted for hydro-electric public utility on Nigerian plateau. If possible graduate or A.M.I.E.E. Three years' agreement in two 18-month tours. Generous allowances, free quarters. Superannuation fund maturing at age 55. Minimum salary £65 per month plus 15% cost of living bonus.—Apply, stating qualifications and experience to Box No. 2755, Electrical Times. (E 255)

DENIS FERRANTI METERS LTD., Bangor, North Wales, require ENGINEERS with degree or H.N.C. for Design Laboratory. Experience in design of watt-hour meters, electrical mechanisms or instruments desirable. Excellent opportunity in expanding department for men able to work under own initiative. Salary commensurate with experience. (E 256)

DRAUGHTSMEN required for low-tension small switch and fuse gear and electrical distribution equipment. —Write, giving age, details of experience and salary expected, to the Personnel Officer, W. T. Henley's Telegraph Works Co. Ltd., Gravesend, Kent. (E 273)

ELECTRICAL ASSISTANT required for editorial department in London. Preference given to qualified engineer. Previous editorial experience unnecessary, but lively mentality essential. Superannuable.—Write, giving full particulars and salary required, Box No. 2759, Electrical Times. (E 274)

ELECTRICAL DRAUGHTSMAN required for large Sheffield steelworks. Experience is desirable, but not essential, in the preparation of wiring diagrams, shop layouts for lighting, heating and service trenchwork and to be capable of taking measurements on site and preparing cable plans and schedules, together with general service records.—Apply, stating age and details to the Labour Superintendent, Samuel Fox and Co. Ltd., Stocksbridge Works, nr. Sheffield. (E 208)

ELECTRICAL ENGINEER required for large industrial concern under British management near Calcutta. Must be capable of taking charge of large substation and be able to supervise maintenance and repairs of mains and motors. Previous experience essential. Applicant should be under thirty and preferably unmarried. Excellent terms are offered. Reply with full details of qualifications and experience with references to Box No. 2757, Electrical Times. (E 260)

ELECTRICIAN required for Middle East. Experienced in use of conduit, Pyrotenax, earthing, etc.—State age, experience, with copies of reference or names to whom we may apply, to Box No. 2741, Electrical Times. (E 227)

ESTIMATING ENGINEER required for battery traction sales. Electrical degree or Higher National Certificate essential. Previous experience in similar job an advantage, but not essential. Age not over 30. Permanent post carrying pension for suitable applicant.—Apply by letter in first instance, outlining experience and salary desired, to Commercial Manager, Nife Batteries, Redditch, Worcs. (E 209)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

ELECTRICAL ENGINEER required by consulting engineers for their Westminster office. Applicants should have served an apprenticeship with a reputable electrical engineering firm and must be Corporate Members of the Institution of Electrical Engineers. They should have experience in the design and layout of substation equipment, distribution network, power and lighting installations and pumping plant. Experience with steam, hot water and electric heating would be an advantage. Age 35 to 45, salary according to qualifications and experience. —Apply by letter with full particulars of age, qualifications and experience to Box No. 6868, c/o Charles Barker and Sons Ltd., 31 Budge Row, London E.C.4. (E 281)

FERRANTI LTD. wish to make new appointments in their power transformer design office, and invite applications from suitable candidates for:—

(a) SENIOR DESIGN ENGINEERS.
(b) JUNIOR DESIGN ENGINEERS.

Candidates for the senior appointments should have had previous electrical design experience in power engineering preferably, but not necessarily, on transformers. A university degree is desirable, but other alternative qualifications will be considered. For the junior appointments applications are invited from young graduates or holders of the Higher National Certificate with an interest, and preferably some experience, in design of transformers or other electrical plant.

The appointments are to the permanent staff of an expanding design group and carry attractive salaries with excellent prospects of advancement. The positions are covered by the firm's staff pension scheme.

Forms of application from Mr. R. J. Hebbert, Staff Manager, Ferranti Ltd., Hollinwood, Lancs. Please quote Ref. WLE. (E 275)

JUNIOR ENGINEER required for sales office of temperature control engineers.—Write, giving age, training and experience, to DHS, c/o The Rheostatic Co. Ltd., Slough, Bucks. (E 170)

LEADING firm of C.M.A. cable makers have opening for man with personality and ability to negotiate at executive level with selected buyers in the North of England and Scotland. Salary will be commensurate with the importance of the appointment. Advertiser's staff are aware of this vacancy.—Applications in confidence, giving full details of education and previous experience, to Box No. 2753, Electrical Times. (E 246)

REPRESENTATIVE. E.W.F. and R.W.F. members have vacancies in the Bristol, Leicester and Nottingham areas for representatives, fully experienced, to take over existing connections.—Reply in confidence to Sales Manager, Box No. 2761, Electrical Times. (E 276)

SALES ENGINEER required to promote sales of standard and special types of lighting, communications and electronic cables to Government depts., research establishments, nationalised industries, etc. Existing connections essential. Remuneration by salary and commission.—Write fullest details Box No. 2707, Electrical Times. (E 147)

SENIOR DRAUGHTSMAN required having experience in design and manufacture of cable-making machinery.—Applications in writing, stating age, technical qualifications, experience and salary required, to Employment and Welfare Manager, Johnson and Phillips Ltd., Charlton, S.E.7. (E 184)

TELECOMMUNICATIONS. Consulting engineers require two JUNIOR ENGINEERS for line telecommunication work mainly in their London Office but some travelling in the United Kingdom and abroad may be necessary. Applicants must have examination qualification for Associate Membership of the Institution of Electrical Engineers and at least two years' experience of telecommunication engineering concerned with overhead or underground cable construction or maintenance, carrier systems, manual and automatic telephone exchange equipment, line or V.F. telegraphs. Salary according to qualifications and experience but not less than £650 per annum. Staff required to join contributory superannuation scheme after two years' service. Applications with full details of qualifications and experience to Preece, Cardew and Rider, 8-12 Queen Anne's Gate, Westminster, S.W.1. (E 261)

TRANSFORMER ENGINEER required, fully experienced in the design of transformers up to 132,000 V. This position is with a progressive transformer organisation and offers excellent opportunities for an ambitious engineer with the necessary experience.—Write, giving full particulars, to Box No. 2763, Electrical Times. (E 277)

APPOINTMENTS WANTED

ENGINEER, Grad.I.E.E., A.M.I.Plant.E. (31), experienced all types installations, h.t. and l.t., plant maintenance, 3½ years consulting engineers on generating station construction, seeks progressive position U.K. or overseas.—Box No. 2723, Electrical Times. (E 187)

PROTECTION and Control ENGINEER, extensive experience in application, engineering and commissioning of protective and control equipment for major generation and transmission installations home and overseas, seeks responsible position. North East coast.—Box No. 2713, Electrical Times. (E 151)

WINDING SHOP FOREMAN, thoroughly experienced winding/assembling/testing all types and sizes of machines a.c.-d.c., repair shop or production, desires change.—Box No. 2735, Electrical Times. (E 201)

WORK WANTED

A.C. and d.c. MOTOR REWINDS and REPAIRS. Prompt service fully guaranteed. Edgware 5566 (4 lines).—Service Electric Co. Ltd., Stanmore, Middx. (E 13)

BURNT OUT fluorescent tubes RECONDITIONED.—E. J. Dawes Ltd., Erimus Works, Stockton Street, Middlesbrough. (E 34)

FISHER FOUNDRIES LTD., Greet, Birmingham, have immediate capacity for machine moulded PRECISION CASTINGS in gunmetal and grey iron, ¼ to 30 lb. All castings shot blasted.—Telephone: Birmingham, Victoria 0197. (E 17)

WORK WANTED. Capacity available for all types of COIL WINDING.—Box No. 2425, Electrical Times. (E 18)

WANTED

A.C.-D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co. Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (E 8)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co. Ltd., 22-26 Britannia Walk, London N.1. (E 4)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper Ltd., 176 Brady Street, Bethnal Green, E.1. (E 1)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock water-tube boilers. Best prices paid. Prepared to purchase Babcock and Wilcox water-tube boilers for dismantling.—Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath, Staffs. (E 2)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (E 6)

FOR SALE

CABLES & WIRE

BANKRUPT CABLES, all sizes available, also random lengths.—BDCO 591, Green Lanes, London N.8. (E 283)

ELECTRIC CABLE, twin cab tyre, 14/012, price 40/- per 100 yd. drum.—H. H. Bradford Ltd., Ramsey, Harwich, Essex. (E 240)

1,000 yards 1680/0076 in. 400 amp WELDING CABLE, T.R.S. Brand new stock.—Saxonia, Greenwich, S.E.10. (E 257)

DOMESTIC APPLIANCES

GRUBB IMMERSION HEATERS. No purchase tax on the 7 kW models. Provision for usual domestic loadings as required. All sizes, 16 in. to 30 in. Immediate delivery.—For particulars and trade terms, write distributors, John Owner and Co. Ltd., Springfield Road, Birmingham 13. Tel.: Springfield 2939. (E 22)

ENGINEERING PLANT & MATERIALS

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

THE British Electricity Authority invites tenders for the SALE of scrap plant at the Lincoln Power Station. The successful tenderer shall dismantle and remove the plant. The plant includes the removal of two TURBO-ALTERNATORS and four stoker-fired WATER TUBE BOILERS.

The specification for the plant and conditions of sale No. 6/Lincoln/57/M.25 may be obtained from the Divisional Controller, British Electricity Authority, East Midlands Division, Barker Gate, Nottingham, quoting Ref. GC/FF/GGT. Application in writing should be accompanied with a deposit of £2, which will be returned upon receipt of a bona-fide tender. Tenders are to be delivered to the British Electricity Authority not later than 12 noon on Monday, August 31, 1953. (E 233)

PARKER'S sheet metal FOLDING MACHINE, heavy vice model, capacity 18 gauge M.S. by 2 ft wide, loose attachments for radio chassis making, weight 22 lb, price 42s. 6d. Attachments 1s. 6d. per foot, carriage 4s., with attachments 5s. 6d. Send for details.—A. B. Parker, Wheatcroft Works, Wellington Street, Batley, Yorks (Tel. 426). (E 247)

GENERATING PLANT

D.C. GENERATORS. Two 540 kW, 130/175 V D.C. GENERATORS by Bruce Peebles, 4,125/3,075 amps. Shunt interpole, open-type frames, split carcase. Suitable for direct coupling. Speed 428 r.p.m.

350 kW, 250 V D.C. GENERATOR by G.E.C. Six-pole, compound interpole. Suitable direct coupling only. Speed 300 r.p.m.

250 kW GENERATOR by Met-Vick for 500/440 V d.c., two-wire, 500 amps. Speed 375 r.p.m. Open type, compound wound.

200 kW GENERATOR by E.C.C. for 200 V d.c., speed 1,000 r.p.m. Open type, single pedestal bearing. Compound wound, fitted interpoles.

200 kW GENERATOR by Mavour and Coulson for 500 V d.c., 400 amps. Speed 360 r.p.m. Open type, six-pole, compound interpole wound. Single pedestal R.O.B.

75 kW CROMPTON, 110 V d.c., 525 r.p.m., 682 amps. Shunt interpole wound.

George Cohen Sons and Co. Ltd., Wood Lane, London W.12 (Tel.: Shepherds Bush 2070), and Stanningley, nr. Leeds (Tel.: Pudsey 2241). (E 248)

GENERATOR, 230/250 V a.c., diesel, 15 kVA. Excellent condition.—Tel.: Elstree 2214. £150 o.n.o. (E 270)

TWO Identical 20 6-kW Crompton-Parkinson D.C. GENERATORS, 235/340 volts, 122·5 amps., 300 r.p.m., shunt/compound wound, excellent condition.—Blick, 23 Sundial-lane, Great Barr, Birmingham 22A. (E 264)

LIGHTING EQUIPMENT

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NOTICE is hereby given that Verwaltungsgesellschaft der Werkzeugmaschinenfabrik-Oerlikon seek leave to amend the Complete Specification of the Application for Letters Patent No. 688,881 for an invention entitled "SOUND RECORDING AND REPRODUCING MACHINE."

Particulars of the proposed amendments were set forth in the Official Journal (Patents), No. 3358 dated June 24, 1953.

Any person may give Notice of Opposition to the amendment by leaving Patents Form No. 36 at the Patent Office, 25 Southampton Buildings, London W.C.2, on or before July 24, 1953. (E 282)

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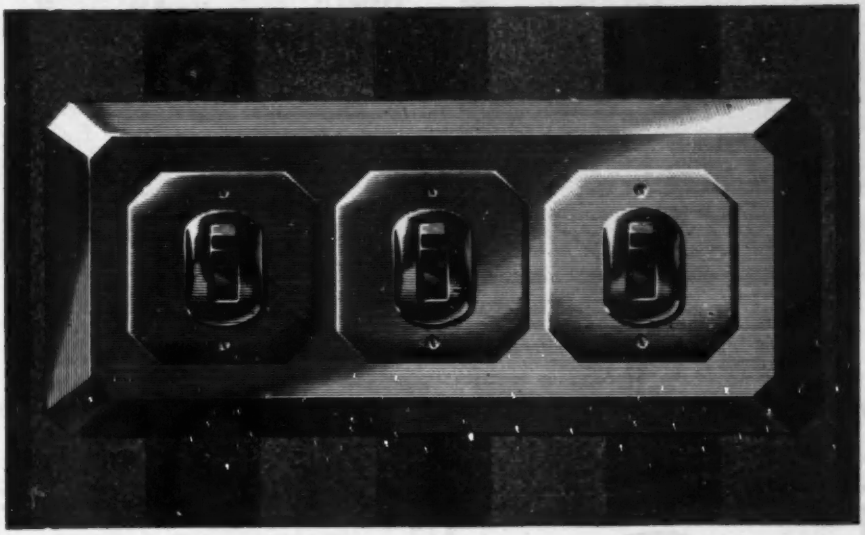

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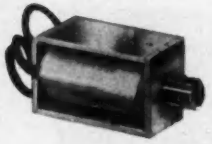

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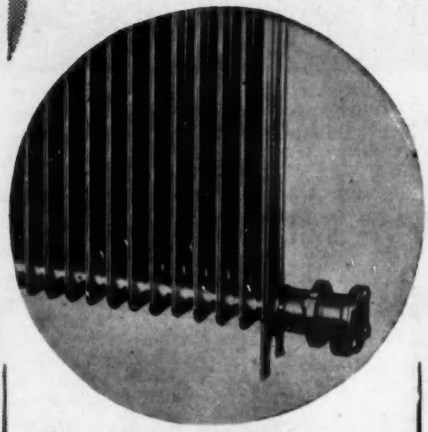

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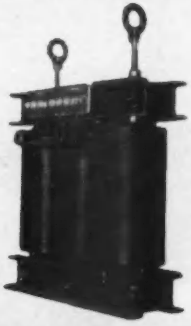

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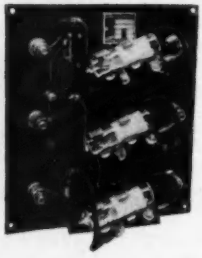

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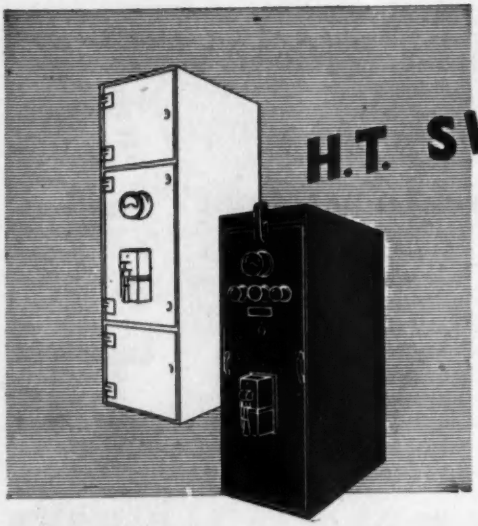

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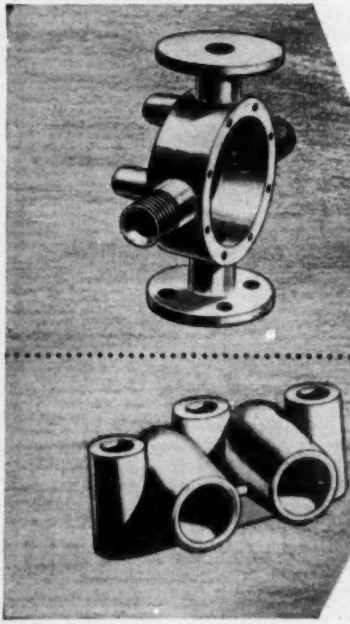

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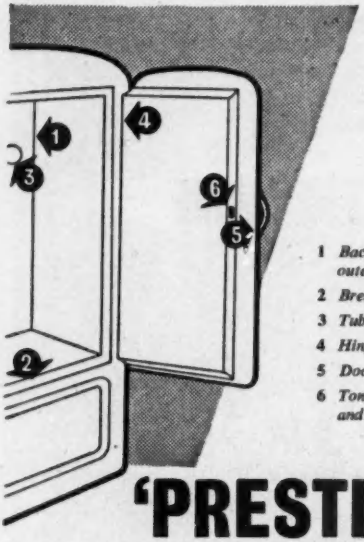

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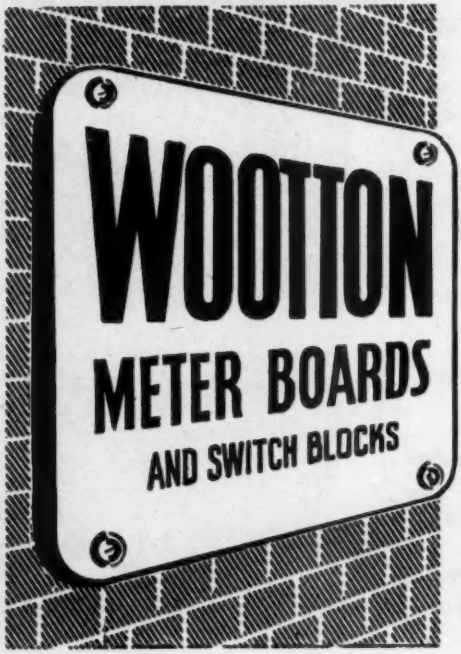

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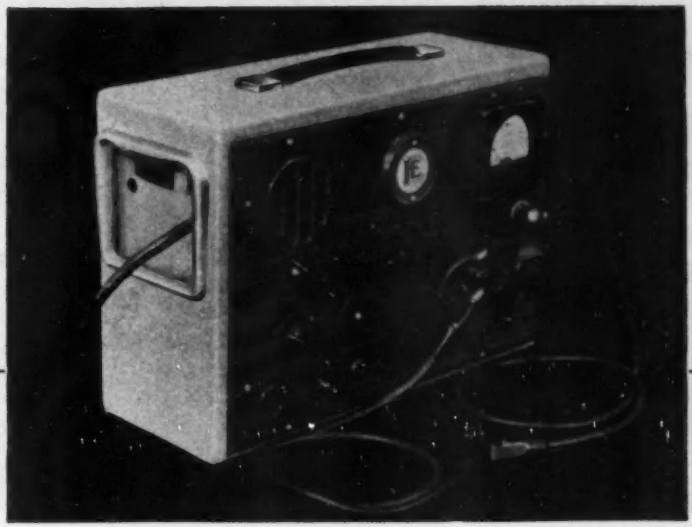

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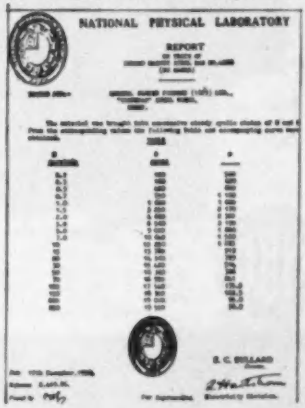

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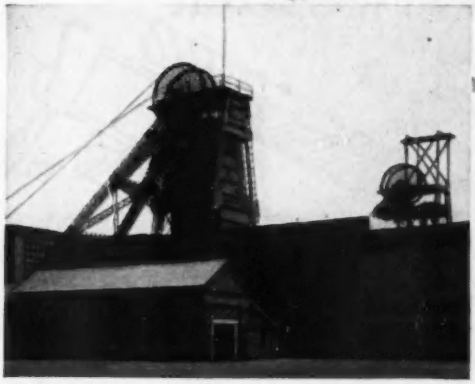

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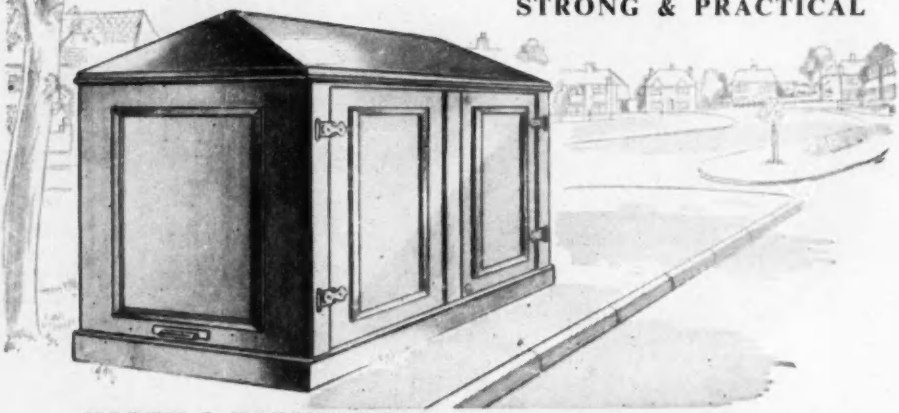

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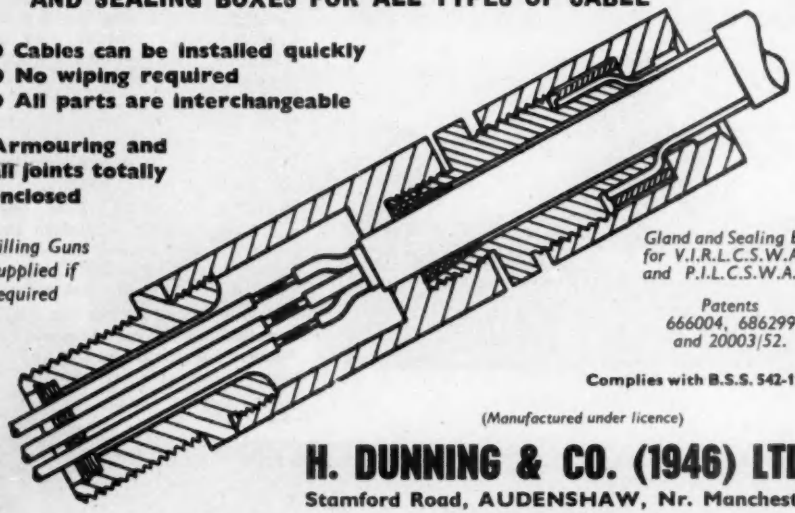

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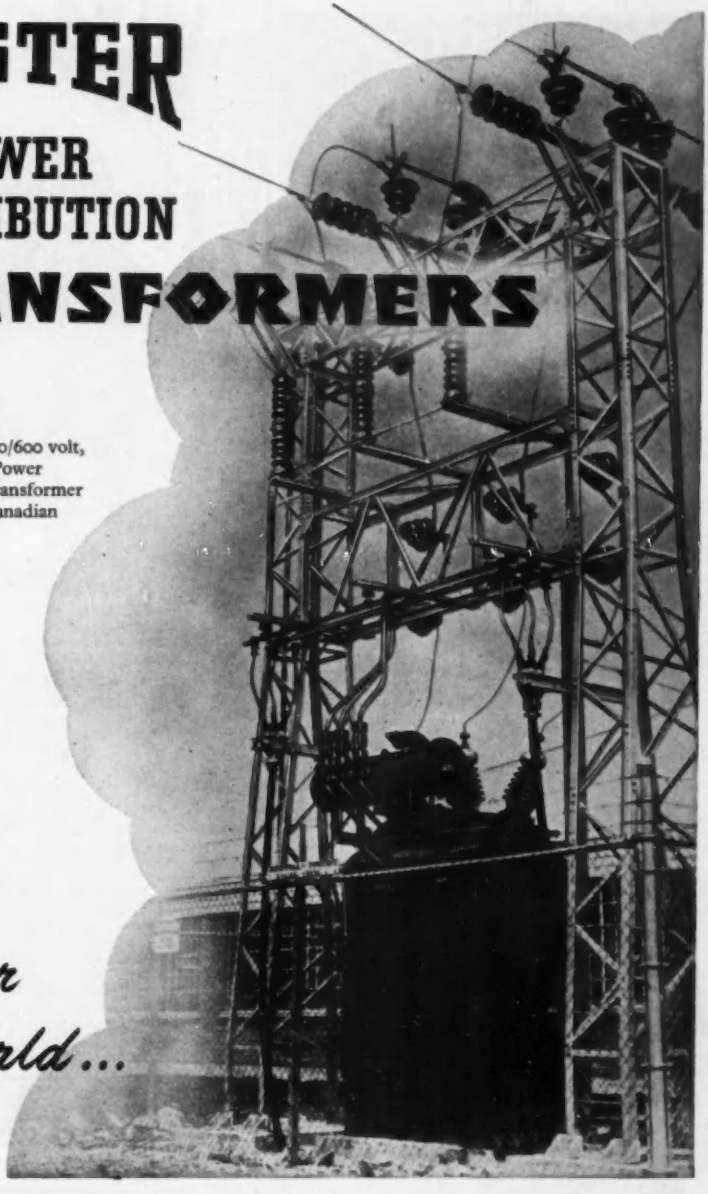

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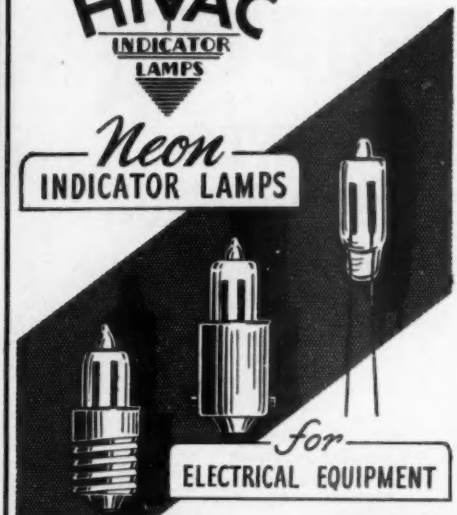

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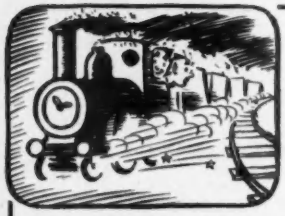

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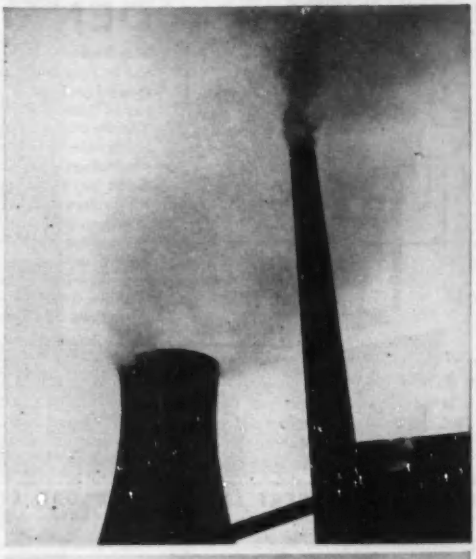

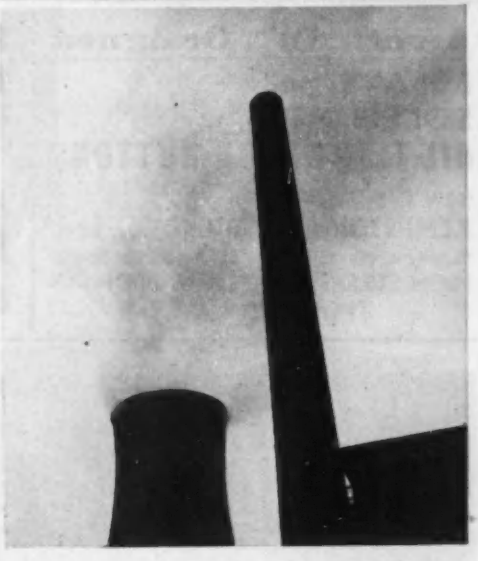

(*above*)
Huncoat Chimney: precipitators off

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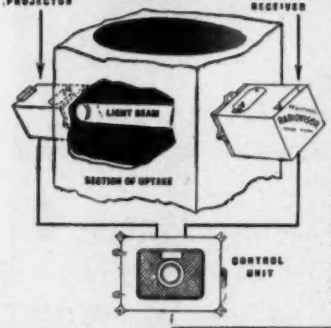

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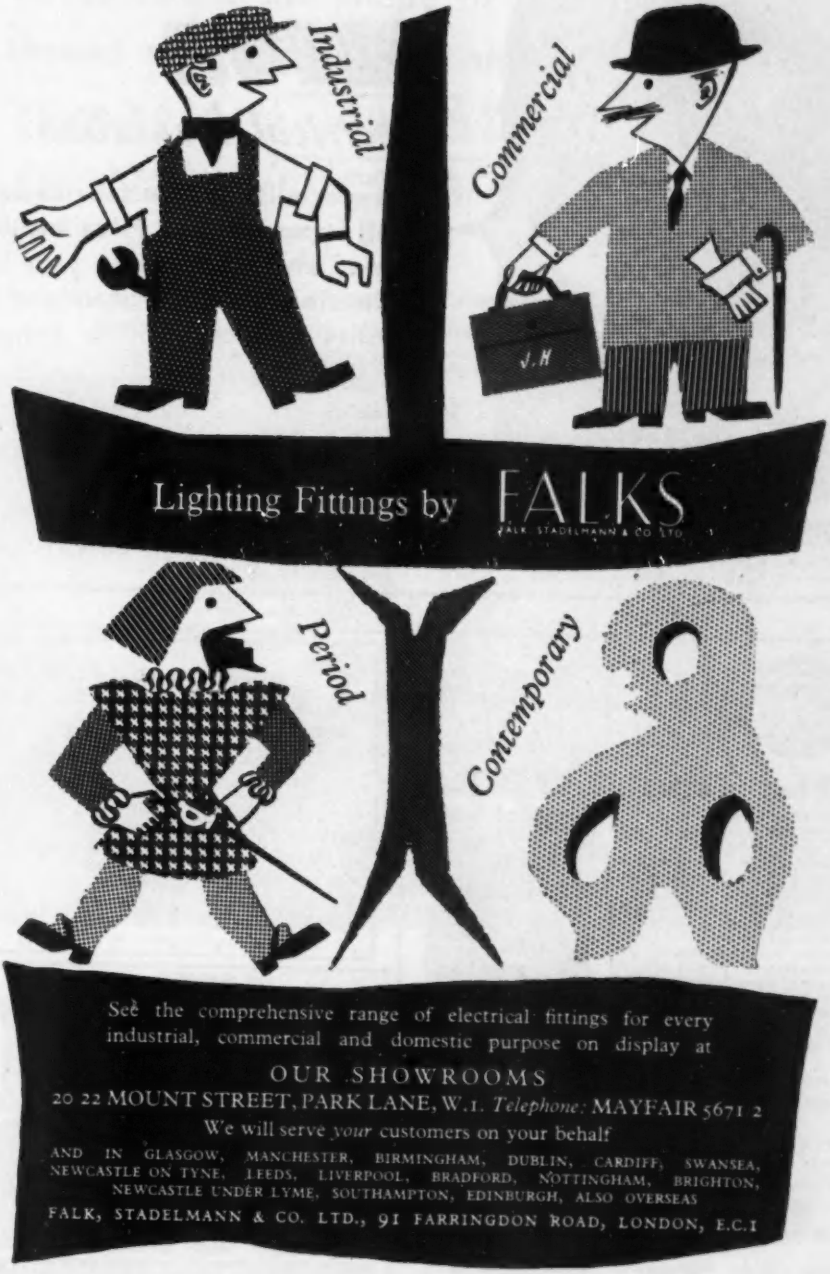
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$$\frac{d}{ds}\left\{\left(1-\frac{x^2+y^2}{2}\right)\frac{dy}{ds}\right\}+y+\lambda\sqrt{x^2+y^2-\left(x\frac{dy}{ds}-y\frac{dx}{ds}\right)^2}\left\{-x+\frac{dy}{ds}\left(x\frac{dy}{ds}-y\frac{dx}{ds}\right)\right\}=0$$

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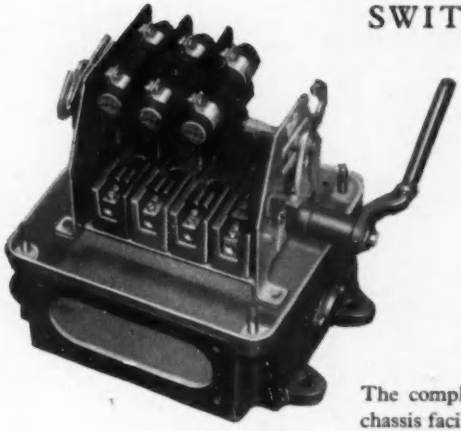

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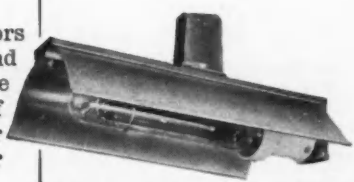

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